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YOSEMITE BUTTERFLIES

AN ECOLOGICAL SURVEY OF THE BUTTERFLIES OF THE YOSEMITE SECTOR OF THE SIERRA NEVADA, CALIFORNIA

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FOREWORD

Organized interpretation of the chief features of National Parks had its beginning in Yosemite National Park in 1920. Suitable guide leaflets and bulletins found a useful place in the educational program. At first printed material covered wide fields of nature study. But with more visitors have come many with specialized backgrounds and they seek help. Whereas, the first bulletins attempted coverage of all insects found, we now come to one dealing only with butterflies. The senior author graduated from the Yosemite School of Field Natural History with the Class of 1933 and made his first contribution to the subject by publishing a list of the Butterflies of the Boundary Hill Research Reserve (Bull. Southern California Academy of Sciences, 33, Sept.-Dec., 1934, pp. 131-135). He widened his studies to the Butterflies of Yosemite National Park in the fifties and herewith is a paper that emphasizes where each butterfly is found and what plant its larvae feed upon. Colored plates give the amateur a chance to identify species found and the text places zonal locations and ecology. Other national parks that have profited by the senior author's field work are Grand Canyon, Glacier, and Grand Teton. Crater Lake and Lassen have profited similarly from the field work of the junior author.—Harold C. Bryant.

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William Hovanitz, Founder, The Lepidoptera Foundation
Editor, The Journal of Research on the Lepidoptera

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HISTORICAL NOTE

The authors are indebted to Mrs. Mary V. Hood, Park Historian, Yosemite National Park, for calling their attention to an early record of butterfly collecting by John Muir, as recorded by W. F. Badè in *Life and Letters of John Muir,* 1924:

> Muir to Mrs. Ezra S. Carr, August 13, 1871. "I suppose you have seen Mr. King, who kindly carried some [butter]flies for Mr. Edwards . . . I collected most of them upon Mount Hoffman, but was so busy in assisting Reilly that I could not do much in butterflies." (*Op. cit.,* Vol. I, p. 292).
>
> Henry Edwards to John Muir, August 25, 1871. "In the small box that you sent me [through Mrs. Carr] are four species new to my collection and two of these are new to science . . . All the specimens are rare, and are different from those found in the Valley. The two new species are the bright crimson copper one from Cathedral Peak, and one of the small bluish butterflies. There is a pair of greenish yellow ones, very rare and interesting. The species was described from a pair only which were taken by the Geological Survey at the headwaters of the Tuolumne River, and strange to say, no others have turned up until you found it now . . . It is really very singular that the remove of a few miles from the Yosemite should produce species so very different from those of the Valley itself, and at the same time so characteristic in their forms." (*Op. cit.,* pp. 263-264).

Of the butterflies mentioned, the bright crimson copper is probably The Lustrous Copper, *Lycaena cupreus* (Edw.), while the greenish yellow ones are undoubtedly Behr's Sulphur, *Colias behrii* Edw. It should be noted, however, that the author is W. H. Edwards in each case. Both species are illustrated on color plate III.

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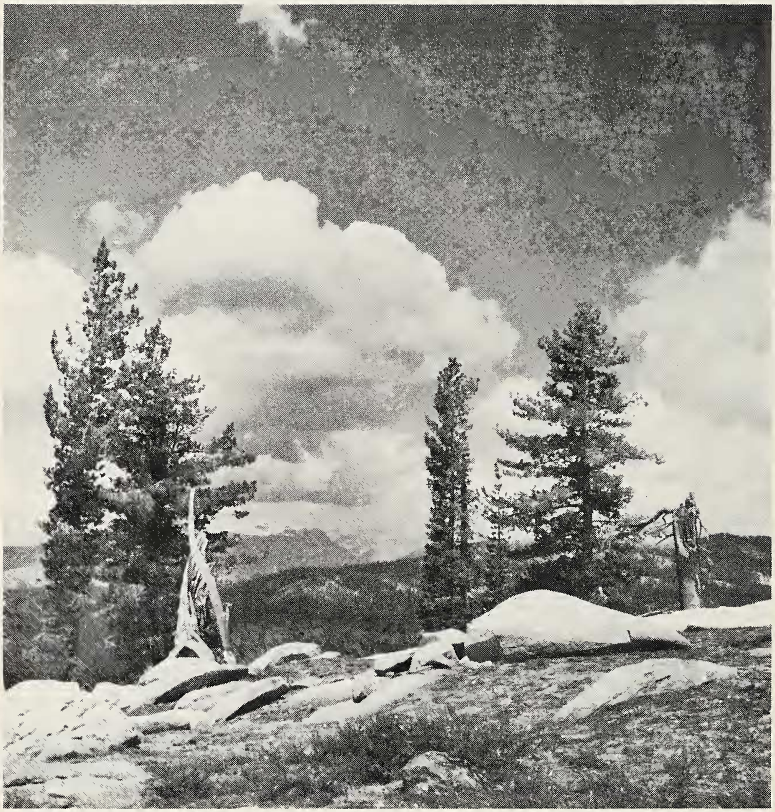


Frontispiece. Boundary Ridge, el. 9,000 ft., Research Reserve. Western White Pine and sparse ground cover of herbs and grasses. Hudsonian life zone elements weakly present. Rocky outcrop association. *Papilio zelicaon* flies to the summit, while *Euchloe creusa hyantis* and *E. ausonides coloradensis* keep to the leeward of the ridge.—Neva Snell.

INTRODUCTION

The Yosemite National Park embraces 1,189 square miles of the most diversified territory to be found in the Sierra Nevada. From the edge of the San Joaquin Valley at near sea level it extends to the crest of the Sierran divide, culminating in Mt. Conness, Mt. Dana, and Mt. Lyell, each over 13,000 feet in elevation. Between these extremes occurs a wide range of climatic conditions, giving rise to a wealth of plant and animal life scarcely to be duplicated elsewhere on the North American continent. The vertebrate fauna has been thoroughly investigated by Grinnell and Storer (1924), who recorded 97 species of mammals, 231 of birds, and 34 of reptiles and amphibians in "Animal Life in the Yosemite," their Yosemite sector extending beyond park boundaries to include part of the San Joaquin Valley and of the Mono Basin as well.

The larger host of invertebrates, and of insects in particular, have long demanded similar investigation. The butterflies are an ideal group with which to begin this study. They are diurnal, or daylight fliers, and so lend themselves to easy observation, as distinguished from moths, of which most are nocturnal or crepuscular in flight. They are also for the most part conspicuous, and therefore likely to attract the attention of even the casual park visitor. Again, their number as species found in a given area roughly approximates the number of bird species, if only those actually residing (*i.e.,* nesting) in that region be enumerated. Thus the butterflies constitute a natural group of insects small enough to be encompassed by the amateur naturalist in a season, yet sufficiently diversified to entice the professional entomologist to return year after year to resolve the problems of habit and habitat that they present.

Like the many other natural attractions of our National Parks, butterflies enjoy the protection of far-sighted legislation and are held in trust for future generations as part of America's outdoor heritage. Their unauthorized removal is contrary to park regulations; however, the advanced researcher who can establish his connection with a public museum or other scientific institution, such as a university, may qualify for one of two types of collecting permits, and should consult the Park Naturalist, with offices in the Yosemite Museum, regarding his eligibility for this consideration.

THE LEPIDOPTERIST'S YOSEMITE

The territory now included in Yosemite National Park has been known to butterfly enthusiasts since the days of the gold rush of '49. The pioneer entomologist, Pierre Lorquin (for whom Lorquin's Admiral is named), followed the mother lode to Placerville, and from thence crossed the Sierra. His exact route is not known, but if he crossed by Tioga Pass, el. 9,941 ft., it is quite possible that the "Great Salt Lake" above which he discovered the Irene Fritillary (*Argynnis atlantis irene*) was Mono Lake, and not the Great Salt Lake of Utah. Indeed, had type localities been designated as carefully then as now, we might find that many of our California butterflies were first observed by a naturalist somewhere in the Yosemite region. The hermit Lembert (whose name is memorialized in Lembert's Dome) for many years supplied the entomological world with specimens of Behr's Sulphur (*Colias behrii*) from his hideaway in Tuolumne Meadows, and it was not until the Tioga Road opened to tourist travel in 1915 that his secret source of this rarity was discovered.

The entire northern section of the park and much of the southeastern part is still traversable by foot or horseback only, and is virgin territory for the lepidopterist. For many years following its establishment in 1925 the Yosemite Field School (short title for Yosemite School of Field Natural History) conducted annual summer excursions into this hinterland under the capable leadership of former Park Naturalist C. A. "Bert" Harwell. Begun as a six-day circuit of the established Hi-Sierra Camps, this "back-country trip" developed into an independent pack caravan that lost itself among the glaciers for a ten-day to two-week period and seldom returned without a contribution to the natural history of the park. During the 1933 to 1937 period the Field School included among its members a number of students of insects whose training and experience made it possible to observe and record much valuable information concerning the habits of rarely encountered species, particularly in connection with the annual surveys of Boundary Hill Research Reserve, instigated in 1933 by Joseph S. Dixon, field biologist, National Park Service. Sections on butterflies in the Research Reserve Reports were written in 1933 by John S. Garth and Fred C. Ziesenhenne, in 1934 by Janet Mabry and Edmund D. Godwin, in 1935 by Theodore H. Eaton, Jr., and in 1937 by Robert Godwin, Frances Cramer, and Verlin Baysinger. The 1936 report, by R. Paul Allen and Carsten Aherns, noted succinctly: "Rain for six days, no butterflies." These reports are on file at the Yosemite Museum, where they constitute an important supplement to the published report of Garth (1935a).

It was as a resurvey after an absence of 23 years from Yosemite that the senior author undertook the present assignment at the request of Chief Park Naturalist Douglass H. Hubbard, the intervening years having been enriched with similar experiences at Grand Canyon, Glacier, and Grand Teton national parks. Desirous of extending the earlier coverage of the park, he began his observations in 1956 in the vicinity of Mather, including the lower Tuolumne, Hetch-Hetchy, and Aspen valleys. In the same year the junior author, whose Yosemite experience also dates from the late 1920's, began under park auspices an ecological study of the area adjacent to Tioga Pass, including a transect from Pilot Peak to Mt. Dana (Tilden, 1959). Since both investigators were limited to brief visits to the area at critical periods, they were fortunate to find in Oakley Shields a summer resident whose activities spanned the entire season at Tuolumne Meadows, where his father, Allan Shields, was a seasonal naturalist. By combining records over the succeeding 7-year period it has been possible to present a fairly consistent picture of the situation in the park's high country, its western approaches, and of the Mono Basin to the east, although the coverage of some areas is less complete than might have been desired.

THE SURROUNDING NATIONAL FORESTS

The visitor driving to and from Yosemite Valley commonly arrives by one of three routes from the west and leaves by another. These are California State Highways 41 via Coarsegold and Wawona, 140 via Mariposa and El Portal (the All-Year Highway), and 120 via Groveland and Buck Meadows. For many miles he travels through wooded foothills of the Sierra and Stanislaus National Forests, where opportunities for observing butterflies are equal to those within the National Park, while collecting is unrestricted. If visiting Tuolumne Meadows, he may wish to leave the Park by its eastern entrance, traveling through Inyo National Forest from Tioga Pass to Lee Vining, there joining U. S. Highway 395. Should he seek an area comparable to the Park's high country he will find it at Saddlebag Lake, accessible by road from Tioga Lake, and adjacent to the Hoover Wildlife Preserve and the Hall Primitive Area. Other east-slope mountain lakes accessible from Highway 395 are Lundy Lake, the Virginia Lakes, and the June Lake circuit.

During the years 1950-1958 the junior writer spent considerable time in the Mono Lake region, obtaining many records later verified and extended by Oakley Shields. In 1958 the senior writer established temporary residence at June Lake and from this base made one-day trips to Gem Lake, Saddlebag Lake, and the Virginia Lakes basin. In 1957 and again in 1959 Oakley Shields crossed the Sierran Divide at Donohue Pass and proceeded southeastward via Agnew Pass to Agnew Meadows. In the spring of 1961 particular effort was made by Park Naturalist Keith Trexler to explore the western foothills, where the season begins from six weeks to two months earlier than in Yosemite Valley. The results of these extra-limital investigations were to add a number of species that rarely, if ever, occur within Park boundaries, but which deserve consideration in any account of the butterflies of the Yosemite region, which includes the encircling National Forest lands as well. It is the authors' hope that the inclusion of these localities outside the Park will serve to entice the butterfly enthusiast away from the few crowded centers and into the less frequented but no less rewarding byways.

YOSEMITE FOOT-TRAILS

While some of the most spectacular butterflies, including the Leto Fritillary (*Argynnis cybele leto*) and the California Sister (*Limenitis bredowii californica*), fly within the confines of Yosemite Valley, the lepidopterist seeking the rarities for which the Park is famous must be willing to do some strenuous hiking. The valley walls rise perpendicularly three thousand feet and more, but once their summit is gained a large expanse of comparatively level country is accessible by means of foot-trails that wind through alpine meadows fragrant with wildflowers. Over 700 miles of such trails traverse the territory within Park boundaries, making the Yosemite a veritable entomologist's paradise.

Leaving the north side of the valley floor by the Yosemite Falls trail, a two-hour climb, best accomplished in the early morning, places one in a position to select either the Eagle Peak, Yosemite Creek, or North Dome trails for a day among the Parnassians (*Parnassius clodius baldur* and *P. phoebis behrii*). Likewise, the ascent to Glacier Point by the Ledge or Four-Mile trails allows the entomologist a choice of either the Pohono or Glacier Point trails that parallel the south rim of the valley and along which the Nivalis Copper (*Lycaena nivalis*) is certain to be encountered. The "high country," reached either via Lake Tenaya or Lake Merced, is the habitat of the Ivallda Arctic (*Oeneis chryxus ivallda*), Malcolm's Checker-Spot (*Melitaea damoetas malcolmi*), and the Lustrous Copper (*Lycaena cupreus*). It was the privilege of the senior writer, as a member of the Yosemite Field School class of 1933, to cover over 200 miles of trail outside of Yosemite Valley, climbing Mt. Lyell, el. 13,090, Mt. Kuna, el. 12,956, and Mt. Dana, el. 13,050 feet, on successive days, and in 1958, exactly 25 years later, to retrace a portion of this itinerary, from Tuolumne Meadows to Merced Lake via Vogelsang Pass, with Oakley Shields. (And aside from the trail's being steeper and the butterflies more elusive, things were much as he remembered them!) Generally speaking, June is the month for exploring the Yosemite Valley, July for the valley's rim, and August for the glacier country.

LIFE ZONES

The incline from El Portal on the west to the Sierra Crest at the eastern park boundary may be subdivided into five regions or life zones, each supporting a distinctive flora and fauna. These zones, in ascending order, are Upper Sonoran, Transition, Canadian, Hudsonian, and Arctic-Alpine. A sixth zone, the Lower Sonoran, occurs a few miles west in the San Joaquin Valley. Thus within the greater Yosemite region is to be found every life zone recognized in temperate North America with the exception of the Subtropical, found only in Florida and southern Texas. In many cases the zones merge imperceptibly, as when a forest predominantly of Jeffrey Pine and Incense Cedar, typically Transition, gives way to one of Red Fir and Quaking Aspen, typically Canadian. In others the line of demarcation may be startlingly abrupt, as when the south slope of a chaparral-clothed ridge (Upper Sonoran) gives way to an open evergreen glade (Transition) on the opposite-facing north slope at the same elevation. While the subject of life zones has been exhaustively treated elsewhere, it may be said that of the factors that determine life zones temperature is the single most important, and that temperature is regulated by latitude, altitude, direction of prevailing winds, proximity to bodies of water, ascending currents of warm air from desert regions, descending drafts of cold air from mountain tops or glaciers, character of substrate, and pattern of drainage.

BUTTERFLIES AS LIFE-ZONE INDICATORS

Plants and animals may be divided into two groups with respect to life zones: those that range over a wide territory and those that adhere closely to a single zone. The former are called cosmopolites because of their unrestricted movement; the latter are called indicators, because their presence is considered sufficient to establish the presence of the zone. (See Grinnell and Hall, 1919). Thus the Cony (*Ochotona*) of the rock slides is an indicator of Hudsonian Zone; the Sierra Nevada Rosy Finch (*Leucosticte*) of the snow banks is an indicator of Arctic-Alpine Zone; and the Chamise (*Adenostoma*) of the chaparral is an indicator of Upper Sonoran Zone. On the assumption that the most permanent indicators are those most to be relied upon, plants and animals might be arranged, in descending order of reliability, in the following order: trees and shrubs, herbs and forbs, mammals, reptiles and amphibians, and birds. In attempting to place insects in such a scale consideration need be given to their dependence on a particular host plant in the larval stage, their normal flight range as adults, and their migratory habits. Thus the insect combines the fixity of the plant, the mobility of the mammal or reptile, though to a resricted degree, and the periodic wanderings of the bird, although less perfectly developed. The insects might with some justification be ranked between

Figure 1. Profile of the YOSEMITE REGION showing life zones and biotic provinces, together with a list of the butterfly species most closely restricted to them.

CALIFORNIAN PROVINCE

UPPER SONORAN ZONE

Coenonympha t. californica
Cercyonis silvestris
Argynnis c. inornata
Euphydryas c. chalcedona
Euphydryas e. rubicunda
Melitaea leanira
Apodemia m. tuolumnensis
Habrodais grunus
Strymon auretorum
Strymon adenostomatis
Callophrys d. windi
Callophrys dumetorum
Callophrys iroides
Lycaena a. arota
Lycaena gorgon
Philotes speciosa
Pieris napi venosa
Epargyreus clarus
Thorybes pylades
Heliopetes ericetorum
Erynnis z. funeralis

TRANSITION ZONE

Argynnis c. leto
Argynnis z. zerene
Argynnis hydaspe
Callophrys johnsoni
Callophrys nelsoni
Everes amyntula
Colias o. chrysomelas
Thorybes diversus
Hesperia h. yosemite
Amblyscirtes vialis

CANADIAN ZONE

Argynnis irene
Boloria epithore
Euphydryas c. sierra
Melitaea hoffmanni
Lycaeides a. anna
Plebejus saepiolus
Plebejus lupini
Anthocharis s. stella
Pyrgus ruralis
Erynnis p. lilius
Hesperia harpalus, blend

HUDSONIAN ZONE

Callophrys lemberti
Lycaena mariposa
Lycaena nivalis
Philotes b. battoides
Plebejus g. podarce
Glaucopsyche l. columbia
Colias behrii
Thorybes m. nevada
Polites s. tecumseh

ARCTIC-ALPINE ZONE

Oeneis c. ivallda
Euphydryas e. nubigena
Melitaea d. malcolmi
Lycaena cupreus
Lycaena p. hypophlaeas
Plebejus s. comstocki
Pieris o. calyce
Parnassius p. behrii
Hesperia miriamae

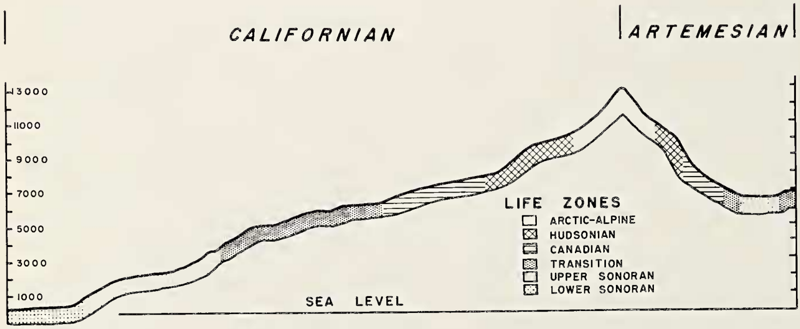
ARTEMESIAN PROVINCE

CANADIAN-HUDSONIAN

Cercyonis oeta
Argynnis z. malcolmi
Lycaena heteronea
Lycaena rubidus
Lycaena editha
Hemiargus isolus
Thorybes m. nevada
Hesperia nevada

TRANSITION-UPPER SONORAN

Coenonympha t. mono
Cercyonis p. ariane
Danaus g. strigosus
Argynnis n. apacheana
Argynnis c. nevadensis
Euphydryas e. monoensis
Melitaea acastus
Limenitis w. nevadae
Apodemia m. mormo
Strymon dryope
Lycaena a. virginiensis
Everes comyntas
Leptotes marina
Philotes b. glaucon
Pieris beckeri
Colias p. hagenii
Hesperia harpalus



the plants and the vertebrates, possessing greater reliability as indicators than the mammals, birds, and reptiles on which much of the ecological work of the past has been done, their importance in this respect having but lately been recognized.

The first attempts at zonal analysis of California butterflies were of necessity incomplete and therefore inconclusive. Based upon the record, in some cases, of but a single specimen, and without knowledge, in many instances, of the larval food plant, the assignment of the species to a given life zone was made without knowledge of its status within that zone, whether as resident or vagrant. The pioneer work of Comstock and Dammers in the 1930's made known the life histories of most of the butterfly species of the southern half of the state, while workers of a younger generation, among whom may be mentioned Don MacNeill, John Burns, G. and R. Bohart, Noel McFarland, Paul Opler, Tom and John Emmel, and Oakley Shields, have defined the range of species and subspecies within the entire state with exactness. Thus the life zone normally inhabited by a butterfly of the Yosemite region can be stated with more assurance than was possible a quarter-century ago. A brief characterization of life zones follows:

Upper Sonoran Zone: The chaparral or "elfin forest" that clothes the foothills from 1,500 to 4,000 feet (occasionally lower) constitutes the Upper Sonoran Zone. It is characterized by a great variety of shrubby plants, many of which exhibit remarkable adaptations for conserving moisture, including anastomosing root systems that check soil erosion. Digger Pine, California Buckeye, Poison Oak, and Chamise (*Adenostoma*) are typical species, as is Interior Live Oak of the included Foothill Woodland community. The Chalcedon Checker-Spot (*Euphydryas c. chalcedona*), California Ringlet (*Coenonympha tullia californica*), and Sylvan Satyr (*Cercyonis silvestris*) seldom stray beyond the confines of this life zone.

Transition Zone: Between the Austral zones (Lower and Upper Sonoran) and the Boreal zones (Canadian, Hudsonian, and Arctic-Alpine) lies a broad intermediate area known as Transition Zone. Its coniferous forest contains the trees of greatest commercial value: Big Tree, Yellow Pine, Jeffrey Pine, Sugar Pine, Incense Cedar, White Fir, and Douglas Fir. Azalea, Nuttall Dogwood, and Black Cottonwood fringe its streams; Black Oak and Golden Cup Oak clothe its valley floors and mountainsides, respectively. The Leto, Hydaspe, and Zerene fritillaries (*Argynnis cybele leto, A. hydaspe,* and *A. z. zerene*) represent its considerable butterfly population. Transition Zone extends from 4,000 (or less in some localities) to 7,000 feet, merging imperceptibly into Canadian Zone along its upper border.

Canadian Zone: Red Fir replaces White Fir in the open forest and Quaking Aspen displaces Azalea and Black Cottonwood along the water courses. A secondary chaparral, reminiscent of Upper Sonoran Zone, but composed of matted Snow Brush (*Ceanothus*), Chinquapin

(*Castanopsis*), and Huckleberry Oak (*Quercus vaccinifolia*), covers the steeper slopes. The Western Banded Elfin (*Callophrys eryphon*), Sierra Checker-Spot (*Euphydryas chalcedona sierra*), and Western Meadow Fritillary (*Boloria epithore*) are good butterfly indicators. Canadian Zone extends from 7,000 to 9,000 feet (or less in some localities), with Lodgepole Pine invading from its upper margin.

Hudsonian Zone: At about the 8,500 foot level Lodgepole Pine appears, to be joined at the 9,000 foot level by Mountain Hemlock to form the Hudsonian forest, discontinuous because of the tremendous rock slides and glacial cirques. Tuolumne Meadows, at 8,600 feet, is pure Hudsonian and here are found Behr's Sulphur (*Colias behrii*), the Podarce Blue (*Plebejus glandon podarce*), and the Mariposa Copper (*Lycaena mariposa*). The upper limits of Hudsonian Zone are defined by timberline at approximately 11,000 feet.

Arctic-Alpine Zone: The Alpine Willow, stunted to a height of a few inches, and the Sierra Nevada Rosy Finch inhabit the bleak talus slides and snow banks above timber line. The zone is characterized by perennial herbs with small tops and large root systems. The heathers, *Bryanthus* and *Cassiope,* and Alpine Sorrel (*Rumex*) cling to meager patches of damp soil. The Ivallda Arctic (*Oeneis chryxus ivallda*), Malcolm's Checker-Spot (*Melitaea damoetas malcolmi*), and the tiny Yosemite Blue (*Plebejus shasta comstocki*) fly from 11,000 feet (occasionally less) to the tops of Mt. Dana and Mt. Lyell. Recently Miriam's Skipper (*Hesperia miriamae*) has been added to the strictly Arctic-Alpine list.

It should be remembered that it was in California, and particularly on the west slope of the Sierra Nevada, that most of the detailed work on life zones, including the delineation of indicator species, was done. It is also on the west slope of the Sierra Nevada and Cascade ranges that life zones attain their optimum development, occurring in regular succession from west to east in response to moderate gradients of slope and a comparatively mild, ocean-controlled climate. Elsewhere life zones are likely to occur haphazardly, with extreme local conditions often overriding the effects of latitude and altitude, which elsewhere are the principal factors governing temperature, on which the life-zone concept was originally based. One of these, the humidity factor, was taken into consideration by Grinnell, Storer, and Dixon in both the Yosemite and Lassen sectors, which included an arid region east of the Sierra divide. Their concept of a trans-montane fauna conditioned by high aridity as opposed to a cis-montane fauna conditioned by high humidity leads us to the principle of replacement of one set of zonal indicators by another whenever certain natural boundaries are transgressed. This is better expressed within the context of a more recent ecologic concept, that of the Biotic Province.

BIOTIC PROVINCES

The replacement of one set of indicator species by another can be so complete that we may question whether we are dealing with the same life zone in two widely separated regions, or even in adjacent regions, when each indicator species has been replaced by a different but closely related species or subspecies. The solution to this predicament is found in the concept of the Biotic Province, originated by Vestal (1914) and developed by Dice (1943), who divided the North American continent into 28 biotic provinces, of which 14 occur in states west of the Rockies, 7 in California. These are geographical areas, permanent and mutually exclusive, and containing within their confines vertical bands that Dice calls, not life zones, but life belts. In such a system the principle of replacement need not be considered, for by definition no life belt extends beyond its province, although similar life belts may occur in adjacent provinces.

In the Yosemite region, as has been mentioned, all life zones are represented from Lower Sonoran (in the San Joaquin Valley) to Arctic-Alpine, with a correspondingly wide spectrum of plant and animal life. Park boundaries are drawn, however, in such a manner that the eastern boundary coincides with the crest of the Sierra Nevada, thus limiting the park proper to one biotic province, the Californian. If we extend the Yosemite sector eastward to include the eastern slope of the Sierra (as did Grinnell and Storer in extending their Yosemite sector to the shore of Mono Lake), we will have added another biotic province, the Artemesian, and with it the replacement species of that province, potentially doubling the list of species for zones above 6,500 feet. No more than this could be accomplished by combining the species lists from two different parks, the one completely Californian, the other Artemesian. Furthermore, such an extension is necessary in order to compare the butterfly faunas of Yosemite and Lassen, whose boundaries stop at the Sierran Crest, with those of Glacier and Rocky Mountain, whose boundaries include territory on both sides of the Continental Divide.

An unexpected dividend for the biologist of this meeting of faunas along the border of two biotic provinces is the opportunity of studying natural hybridization. Perhaps no better experimental material has been provided by nature for this purpose than the butterflies known as Admirals (genus *Limenitis*). These are found throughout North America and are known as allopatric, or replacement, species. Opportunity to observe natural hybridization between Californian *L. lorquini* and Artemesian *L. weidemeyerii nevadae* occurs where their ranges meet on the west shore of Mono Lake. A similar opportunity to observe natural hybridization between Montanian *L. lorquini burrisoni* and Saskatchewan *L. arthemis rubrofasciata* occurs on the east side of Glacier Park, at Many Glacier. Whether the fact that they hybridize readily reduces the *Limenitis* complex to a single polymorphic species is a debatable question; however, it should be noted that the interbreeding is limited to a narrow buffer zone and does not extend to entire populations, and that wherever it occurs both parent species are present, as would be required to perpetuate the hybrid, which is presumed to be sterile.

PLANT COMMUNITIES

A more subtle ecologic division than either life zone or biotic province has long been sought by entomologists attempting to define more closely the habitats of insect species. This has at last been provided in the system of plant communities developed by Munz and Keck (1949, 1950). Of the 28 California plant communities recognized by these authors, at least 16 (plus two of our own designation) occur in the greater Yosemite region. Here an attempt is made to list in sequence the plant communities that one might encounter in crossing the Sierra Nevada from San Joaquin Valley to Mono Lake, with a side trip into Yosemite Valley:

1. Valley Grasslands (on leaving the Valley).
2. Foothill Woodland (as around Cathay).
3. Chaparral (the familiar "elfin forest").
4. Coastal Sage Scrub (formerly California Sagebrush Association, includes Honey Sage Scrub, occurs sporadically).
5. Oak Woodland (including Golden Cup Oak lands; as Yosemite Valley).
6. Mixed Evergreen Forest (Laurel-Madroño association; as Yosemite Valley walls).
7. Yellow Pine Forest (monotypic, with an understory of "Mountain Misery").
8. Mixed Forest (non-pure Douglas Fir, Yellow Pine, and broadleaf trees below pure conifers). Our designation; probably an ecotone.
9. White Fir-Cedar Forest (on cut-over land, as at Mather). Our designation; a successional sub-climax or post-climax community.
10. Red Fir Forest (as between Tamarack Flat and Smoky Jack).
11. Lodgepole Pine Forest (as Tuolumne Meadows).
12. Subalpine Forest (often with Mountain Hemlock and White-Bark Pine; as Tioga Pass).
13. Alpine Fell-Fields ("rock gardens" above timber line; as Gaylor Lakes).
14. Juniper Woodland (eastern declivity; as below Tioga Pass).
15. Piñon-Juniper Woodland (lower down; as around Lee Vining).
16. Sagebrush Scrub (Great Basin Sage, *Artemesia tridentata*).
17. Shadscale Scrub (the Salt-Bush type of scrub).
18. Alkali Sink (as around Mono Lake).

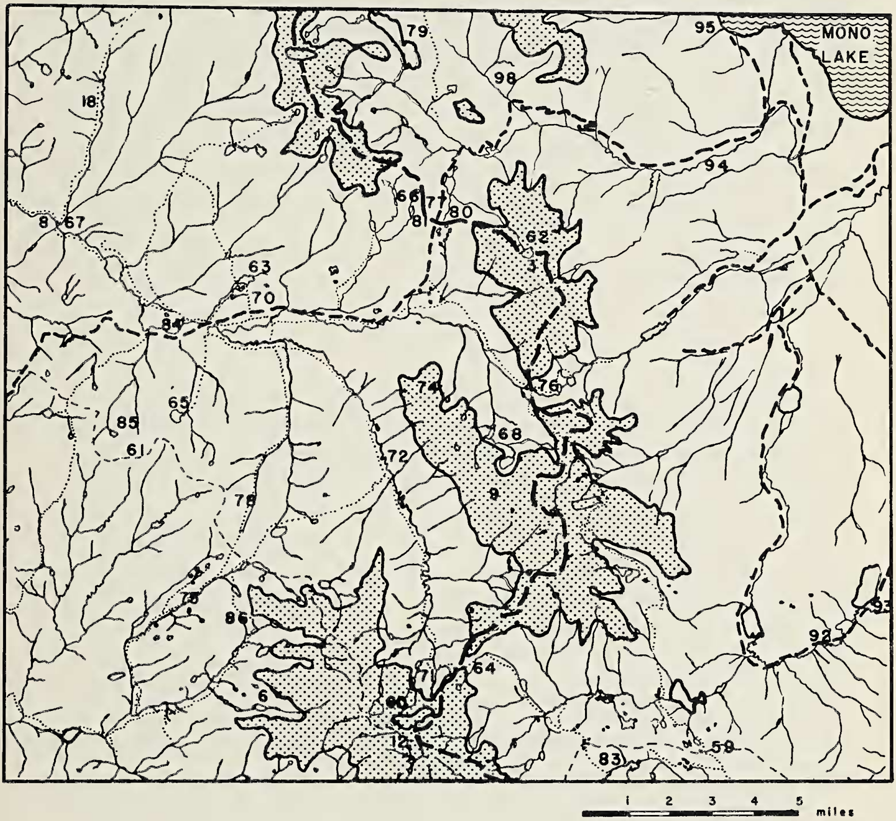


Figure 2. Map showing the YOSEMITE high country, indicating roads --------, trails..........., streams _______________, areas over 11, 000 feet in elevation and collecting localities:

1933-1934 : 3, Mt. Dana; 6, Florence Lake; 8, Glen Aulin; 9, Kuna Crest; 12, Mt Lyell; 18, Coldwater Canyon.

1956-1962: 59, Agnew Pass; 60, Bert L.; 61, Cockscomb Pk.; 62, Mt. Dana, N. slope; 63, Dog L.; 64, Donohue Pass; 65, Elizabeth L.; 66, Gaylor L.; 67, Glen Aulin; 68, Helen L.; 70, Lembert Dome; 71, Lyell Base Camp; 72, Lyell Fork Meadow; 74, Mammoth Pk.; 75, Merced R.; 76, Mono Pass; 77, Pilot Pk.; 78, Rafferty Ck. Tr.; 79, Saddlebag 80, Tioga Pass; 81, NW above Tioga Pass; 83, Thousand Island L.; 84, Tuolumne Meadow; 85, Unicorn Pk.; 86, Vogelsang Pass.

East slope , 1956-1962: 92, Gull L.; 93, June L.; 94, LeeVining Cr.; 95, Mono L.; 98, Warren Ck.

[One of us (Tilden) suggests the presence of still another east-slope brush community, consisting of *Cercocarpus, Purshia,* and desert *Prunus,* not provided for in the system proposed by Munz and Keck.]

It will be noted that by far the greater number of plant communities (13 as against 5) are found on the western slope, which has the greatest extent both in distance and in elevation. It will further be seen that as one progresses beyond 13, which represents the Sierran crest, the plant communities are entirely different from those before 13, yet they occupy corresponding altitudinal belts and life zones in reverse order. This difference in plant life is paralleled by a difference in animal life, including the insects, and is evidence that each slope lies in a different biotic province, where relative humidity, rather than temperature difference based on altitude, is the controlling factor. Perhaps no better example could be given of the need for both systems (life zones and biotic provinces).

FOOD PLANTS

The lepidopterist who pursues his interest seriously becomes increasingly aware of the dependence of insects on plants. For not only do butterflies as adults seek flowers for nectar, but as caterpillars they depend on vegetation for sustenance. Many are highly selective in their choice of plant food, adhering to one kind and rejecting all others. More frequently, however, any one of a group of related plants will serve: witness the predilection of the Whites for mustards, or of the Sulphurs, for legumes. The lepidopterist soon learns to equate these butterfly preferences with plant groups possessing certain structural resemblances, particularly as regards their flowers, and recognized by botanists as plant families. A list of thirty-eight common plant families and one hundred eleven of their genera on which butterflies of the Yosemite region are known or believed to feed as larvae is presented with the hope that it will lead to further investigation.

Occasionally, and for no apparent reason, a butterfly will be found to feed upon a plant quite unrelated to those usually preferred by its group. Thus *Colias behrii* is known to be a *Vaccinium* feeder, whereas most *Colias* species prefer legumes. But as Hovanitz (1950) has shown, the *Vaccinium*-feeding habit is shared by several *Colias* species in other parts of the world. Since it is highly improbable that such a choice of food plant would have been made independently by each of them, this food habit becomes a clear indication of relationship, setting the *Vaccinium* feeders apart from others of their genus. When one of the Whites, *Neophasia menapia,* forsakes the mustards usual to its group for the needles of a pine tree, we may be certain that it is not temporarily off its diet, but that it is following a behavior pattern as old as the genus itself, and perhaps responsible for its segregation.

Often a butterfly named for the plant believed to be its host has proven to feed upon another. The hair-streak, *Strymon adenostomatis,* was found to feed on Mountain Mahogany (*Cercocarpus*), and not on Chamise (*Adenostoma*), as its given name would imply. (It should have been called "*cercocarpivorous*"!) Indeed, the question as to whether the Blues, *Plebejus acmon* and *P. lupini,* deserve specific distinction may ultimately rest upon whether they feed exclusively on Lupine (*Lupinus*) and on Buckwheat (*Eriogonum*), respectively, or indiscriminately on both.

Yosemite butterflies for which the larval food plant is either unknown or in need of confirmation are the following:

Unknown

Melitaea damoetas malcolmi
Melitaea hoffmanni
Callophrys doudoroffi windi
Callophrys lemberti
Lycaena nivalis
Plebejus glandon podarce
Plebejus shasta comstocki
Lycaeides argyrognomon anna
Thorybes mexicana nevada
Thorybes diversus
Erynnis persius
Erynnis propertius
Polites sonora

Needing Confirmation

Callophrys nelsoni (*Libocedrus*?)
Lycaena rubidus (*Rumex*?)
Lycaena phlaeas hypophlaeas (*Rumex*?)
Plebejus lupini (*Eriogonum*?)
Philotes speciosa (*Eriogonum* in Yosemite?)
Colias zerene (*Amorpha* not found in Yosemite)
Parnassius clodius baldur (for *Vaccinium* only)
Pyrgus ruralis (for *Potentilla* = *Horkelia* only)
Erynnis pacuvius lilius (*Ceanothus*?)

A documented observation of oviposition (egg laying) of any of these species, with positive identification of the plant of choice, or better still, the rearing of any of them from egg to adult would be an important contribution to the natural history of the Yosemite region.

SOME PLANTS ON WHICH YOSEMITE BUTTERFLIES FEED AS LARVAE

In the left hand column of the list (Table 1) that follows, host plants are listed alphabetically by family and genus. (To have listed plants by species would have prolonged the list unduly.) In the middle column the common name of the plant is given. In the right hand column butterfly species known or believed to feed on that plant are listed alphabetically by genus and species. (Subgenera are omitted, as are subspecies, where more than one occurs in Yosemite, unless each is known to have a different food plant.) The symbols o, l, and r indicate that the butterfly has been seen to ovipost on, the larvae have been taken from, or the insect reared to maturity on that plant by one of us. Otherwise, names of host plants have been taken from the literature, carefully culled to eliminate genera not known to occur in the Sierra Nevada. Butterfly species feeding on more than one plant are starred*.

Grasses (POACEAE=GRAMINACEAE) and Sedges (CYPERACEAE) are not listed because detailed information concerning the genera involved is lacking. Known to be grass feeders are all the SATYRIDAE and, of the HESPERIIDAE, the subfamily Hesperiinae. It is believed that when this information becomes available, it will be shown that butterflies exhibit as marked a preference for certain of the monocotyledonous grasses and sedges as they do for certain of the dicotyledonous plants.

THE GEOLOGICAL BACKGROUND

The landscape of the Yosemite region has been moulded by many forces, but by far the most impressive of these has been glaciation. The work of glaciers may be observed in the U-shaped gorges of the Tuolumne and Merced rivers, in the hanging valleys of Little Yosemite and Bridal Veil Creek, in the polished domes and erratic boulders, in the glacial lakes (called tarns) and cirques, and in the minaret summits of Cathedral and Unicorn peaks. Less evident, but no less genuine, are the effects of glaciation on the flora and fauna, including the butterflies. For as the glaciers retreated, the cold-adapted species followed them northward and to the mountain tops, where small glaciers continue to exist on the shaded slopes of Lyell, Maclure, Dana, and Conness. Thus the entire upper tier of life zones, the Canadian, Hudsonian, and Arctic-Alpine, is inhabited by butterfly species whose nearest relatives fly either on other isolated mountain tops in temperature regions or at near sea level in Canada, Hudson Bay, or the Arctic regions, as these zonal names imply. This discontinuous "boreo-alpine" distribution is as much a consequence of Pleistocene glaciation as the polished granite over which one walks along the Merced Lake trail, or the lateral moraines that rim the montane meadows.

A second consequence of Yosemite's geological history is that those butterflies that now fly above timberline, and in particular the grass-feeding Satyridae, such as The Ivallda Arctic (*Oeneis chryxus ivallda*) and Riding's Satyr (*Eumenis ridingsii*), and Hesperiinae, such as the newly found Miriam's Skipper (*Hesperia miriamae*), having no trees but only barren rock on which to alight, have come to resemble exactly the color, shade, and texture of the particular rock found in their restricted habitat, whether it be sedimentary or metamorphic. (See Hovanitz, 1940). In order that the lepidopterist may better appreciate these earthen pigments that provide the backdrop for the Yosemite landscape and constitute the palette from which the colors of Yosemite's alpine butterflies (Plate III) have been selected, although without design on the insect's part, the following quotation by Francois E. Matthes, father of Sierran geology, is given. The italics are the authors'.

> "Next to the broad belt on the lower slope of the Sierra Nevada, the masses of metamorphic rocks situated near the crest of the range are the most extensive. They make up the bulk of Mount Dana, Mount Gibbs, and Parker Peak, as well as the jumble of mountains north of Tioga Pass, whose central summit is Mount Warren. These mountains, in consequence of their composition, are variously tinted in subdued *yellows, browns, reds,* and *purples* and by contrast with the *pale-gray* peaks of granite near by appear somber, as if overcast by perpetual shadows. The metamorphic rocks in this crest region, however, differ appreciably in character as well as in structure from those in the lower belt. There is but little slate among them, schist, quartzite, and volcanic rocks being predominant; and the folding is less deep and less complex. These facts are readily observed on and about Mount Dana, which is capped by gently flexed beds of volcanic origin."
>
> —Matthes, 1930, p. 26.

ACKNOWLEDGMENTS

Among agencies and individuals cooperating in the preparation of this report should be mentioned the National Park Service, Department of Interior, and in particular Park Superintendent John C. Preston and Chief Park Naturalist Douglass H. Hubbard, Yosemite National Park, who issued the necessary permits, and Park Naturalist Keith Trexler, who assisted with the collecting. Among those providing suggestions and information on technical matters were John Burns, Harry Clench, William Hovanitz, C. Don MacNeill, Paddy McHenry, and Paul Opler. Among those furnishing advance information concerning manuscripts in preparation were Cyril F. dos Passos, C. Don MacNeill, and Paul and Anne Ehrlich. Among museums and curators whose collections were consulted were the California Academy of Sciences, Edward S. Ross, and the Los Angeles County Museum, Lloyd M. Martin. Finally, two investigators whose efforts so splendidly supplemented our own, and whose records and observations we have used to such advantage, were Edmund D. Godwin and Allan Oakley Shields.

REGARDING NAMES USED IN THIS PAPER

Since the publication of "Butterflies of California" (Comstock, 1927), no comparable book on California butterflies has appeared. The excellent color plates make this a most useful reference, but time and the activities of butterfly students have brought about many changes. Additional species have been found to occur in California; numerous subspecies have been described; and many revisionary works have appeared. Among these may be mentioned those on Ringlets (Davenport, 1941; Brown, 1955), on Fritillaries (dos Passos and

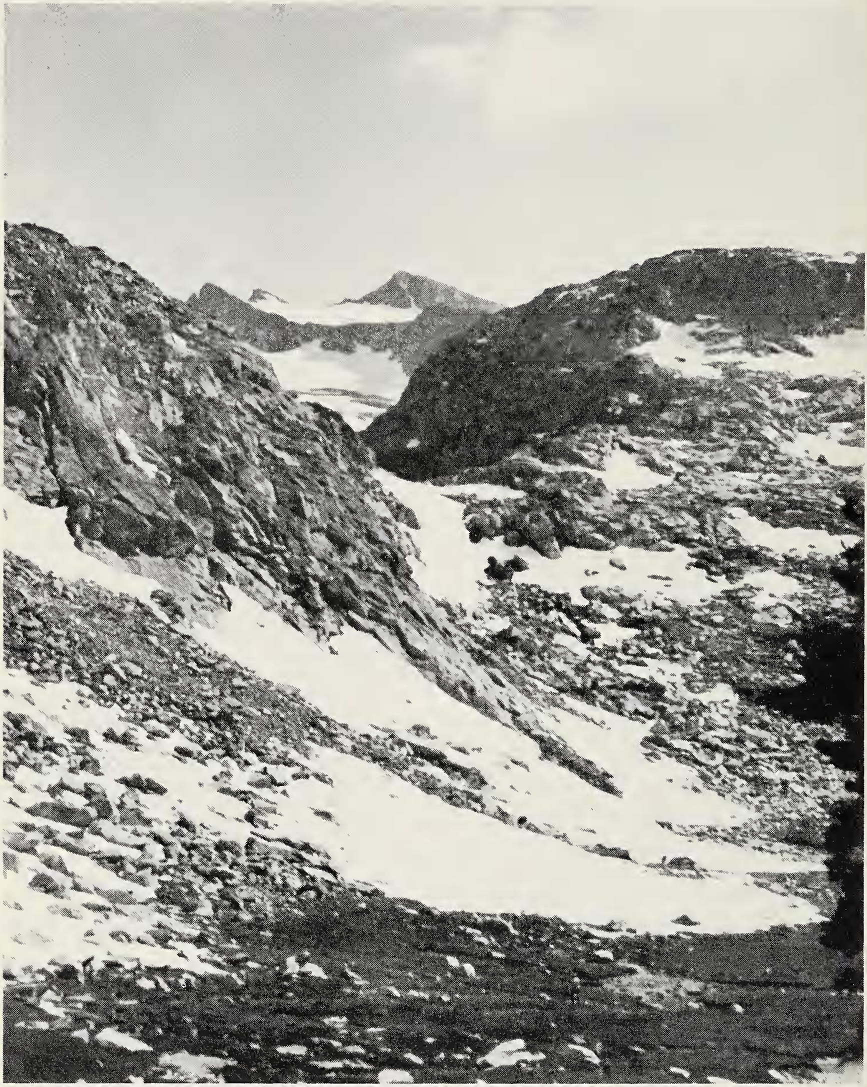


Fig. 3. Mt. Lyell, el. 13,900 ft., from tree-line at about 11,000 ft. (Upper Lyell Base Camp). Arctic-Alpine life zone, Alpine Fell-Fields, with montane meadow and rock garden associations. Habitat of *Lycaena phlaeas hypophlaeas, Euphydryas editha nubigena, Melitaea damoetas malcolmi,* and *Oeneis chryxus ivallda.*—Joseph S. Dixon.

Grey, 1947), on Checker-Spots (Gunder, 1929; Bauer, 1961), on Metal-Marks (Opler and Powell, 1961), on Hair-Streaks (Ziegler, 1960; Clench, 1961), on Coppers (Klots, 1936; Clench, 1961), on Blues (Nabokov, 1949; Downey, 1961), and on Skippers (Lindsey, Bell, and Williams, 1931; Lindsey, 1942). As a result, only a fraction of our California butterflies continue to bear the generic and specific names by which they were known as recently as 1927.

Following the publication of "Check List of Lepidoptera of Canada and the United States of America" (McDunnough, 1938), incorporating changes recommended in "Generic Names of Holarctic Butterflies" (Hemming, 1934), together with the findings of many other workers, no similar standard of reference has been advanced. Publication of a new check list by C. F. dos Passos is believed imminent, and changes made since 1938 will be reflected therein. Many of these will have been anticipated in "A Field Guide to the Butterflies" (Klots, 1951), but this admirable little book treats only the eastern species. Still other modifications appear in "How to Know the Butterflies" (Ehrlich and Ehrlich, 1961).

In deciding what names to use in this article, the authors have tried to steer a moderate course, adopting many names now accepted by common usage, but avoiding some of the more recent innovations until these shall have met with general approval. The sequence and arrangement of genera and families follows as closely as possible what we are led to believe will be the arrangement of the forthcoming check list already referred to. The more advanced student as well as the professional should be able to make use of that publication in conjunction with this one, which is intended primarily as a field guide, and not primarily as a contribution to the systematic literature.

The authors' departure from a strict interpretation of the Rules of Zoological Nomenclature in designating the western subspecies of *Atlides halesus* as *estesi* Clench rather than as *corcorani* Gunder is deliberate. For while it is conceded that Gunder's name is the older of the two, it was applied, not to the entire race, but to a single aberrant individual. We believe that intent should be given due weight in such matters, and it was certainly not Gunder's intent to define the western subspecies, whereas it was Clench's. The same logic is followed in attributing *Lycaeides melissa inyoensis* to Nabokov, and not to Gunder.

ACCOUNT OF SPECIES OF THE YOSEMITE REGION

SATYRIDAE

1a. *Coenonympha tullia californica* West. & Hew. Pl. I, fig. c

b. *Coenonympha tullia mono* Burdick Pl. IV, fig. a

THE CALIFORNIA RINGLET and THE MONO RINGLET are the two races of this widespread species found in the Yosemite region, the former flying in the western foothills, the latter on the sage-brush flats of Mono Basin. Weak fliers, they keep close to the grasses on which the larvae feed. Following the studies of Davenport (1941) and Brown (1954, 1955), all North American ringlets except the rare Hayden's Ringlet, *Coenonympha haydenii* (Edw.), of Wyoming and adjacent states are considered subspecies of the Eurasian *C. tullia* (Müller), although Burdick (personal communication) was inclined to regard his *mono* as a derivative of the Great Basin-Rocky Mountain *C. t. ochracea* Edw., which he appeared to regard as a distinct species.

Life Zones: Upper Sonoran (Transition). Plant Communities: Valley Grasslands, Foothill Woodland; Sagebrush Scrub, Marsh. Host Plants: POACEAE (Grasses).

2. *Cercyonis pegala ariane* (Bdv.)

It is with some hestitation that the name THE ARIANE SATYR is applied to specimens from Mono Lake, because it is BARON'S SATYR, *Cercyonis pegala baroni* (Edw.), that occurs in a similar situation in northeastern California and southeastern Oregon.

Life Zones: Upper Sonoran. Plant Communities: Piñon-Juniper Woodland, Marsh, and Montane Meadow. Host Plants: POACEAE (Grasses).

3. *Cercyonis silvestris* (Edw.) Pl. I, fig. e

THE SYLVAN SATYR is a creature of the chaparral forest that clothes the foothills. A lover of shade, it seeks to lure the pursuer ever deeper into the undergrowth. Its favorite haunts are groves of Manzanita, Scrub Oak, and Mountain Mahogany, interspersed with an occasional Digger Pine.

Life Zones: Upper Sonoran (Transition). Plant Communities: Foothill Woodland, Chaparral. Host Plants: POACEAE (Grasses).

4. *Cercyonis oeta* (Bdv.) Pl. IV, fig. c

THE LEAST SATYR was not encountered in Yosemite Park during the 1933-1934 period, although it was known to inhabit the dry eastern slope of the Sierra Nevada. Since that time, however, it has been found on several occasions in the Tioga Pass region, but always within sight of the Sierran Divide.

Life Zones: Transition, Canadian, Hudsonian (Arctic-Alpine). Plant Communities: Juniper Woodland, Piñon-Juniper Woodland, Sagebrush Scrub (Alpine Fell-Fields). Host Plants: POACEAE (Grasses).

5. ***Oeneis chryxus ivallda*** **(Mead)** **Pl. III, fig. b**

THE IVALLDA ARCTIC inhabits the bleak, wind-swept summits that culminate in Mt. Lyell, Mt. Dana, and Mt. Conness. They may be encountered in a boulder-strewn clearing between stands of Mountain Hemlock, as near Vogelsang Camp, on barren ridges, as the crest above Tioga Pass crossed by the Gaylor Lakes trail, or on the moraines just east of Tioga Pass. Edmund Godwin reported "many seen at 12,000 feet on Matterhorn" in 1934. Erratic fliers, extremely difficult to capture, the Arctics have a habit of leaning with the wind when alighting, their mottled wings resembling a patch of lichen. According to Hovanitz (1940), the gray forms are found on granite, the brown forms on sedimentary rock. The line of contact between the two formations passes through the Yosemite sector and is a conspicuous feature of Sierran geology. Because of the inaccessibility of its habitat, the IVALLDA ARCTIC presents the ultimate challange to the energetic lepidopterist.

Life Zones: Arctic-Alpine (Hudsonian). Plant Communities: Alpine Fell-Fields, Subalpine Forest (Glacial Moraine). Host Plants: POACEAE (Grasses).

DANAIDAE

6. ***Danaus (Danaus) plexippus*** **(Linn.)**

THE MONARCH is common in Yosemite Valley and throughout the lower elevations of the park. Various species of Milkweed grow along the Merced River at Old Village, at Mirror Lake, and at the fork in the road to the Giant Yellow Pine, as well as along the higher trails that follow the canyon rim. It also occurs on the eastern Sierra slope, at Mono Lake, and has been found at Upper Lyell Base Camp (Shields). The banded larvae are easily discernible, but the waxy green chrysalids defy detection.

Life Zones: Unrestricted below Hudsonian. Host Plants: ASCLEPIADACEAE: *Asclepias* (True Milkweeds).

7. ***Danaus (Tasitia) gilippus strigosus*** **(Bates)**

THE STRIATED QUEEN in another milkweed feeder that occurs in Yosemite territory only on the dry east side of the Sierra Nevada, in the vicinity of Mono Lake. It may be distinguished from *Danaus (Tasitia) gilippus berenice* (Cram.) of the southeastern United States by the scattered white scales along the wing veins. Both are subspecies of the tropical *D. (T.) gilippus* (Cram.), ranging northward from Brazil.

Life Zones: Sonoran, both Lower and Upper (= Austral). Plant Communities: Many. Host Plants: ASCLEPIADACEAE: *Asclepias* (True Milkweed), and several other milkweed genera.

NYMPHALIDAE

8. *Argynnis* (*Semnopsyche*) *cybele leto* Behr

THE LETO FRITILLARY is the handsomest butterfly of the Yosemite Valley and the species most certain to attract the attention of the park visitor in the late summer season. From the thistles at Mirror Lake, which they visit for nectar, the butterflies may be traced to the sequestered meadow near Camp 9. Here the velvet-brown females deposit their eggs among the dried grasses, while the ruddy males hover above them, for *leto* is one of the two California fritillaries in which the sexes differ in color, the other being the following *apacheana.*

Life Zones: Transition. Plant Communities: Poplar Woodland (Black Cottonwood). Host Plants: VIOLACEAE: *Viola* (Violet).

9. *Argynnis* (*Speyeria*) *nokomis apacheana* Skin.

Pl. IV, fig. k

THE APACHE FRITILLARY, athough of another species, may be considered the eastern Sierran counterpart of The Leto Fritillary of the western Sierra. Even more spectacular than *leto,* it flies in the well watered meadows of the Owens River drainage, and has been found recently at Gull Lake and Mono Lake. The females emerge a full two weeks later than the males, and so dissimilar are the sexes in color that they might be mistaken for different species. The under side of the male is illustrated in color.

Life Zones: Upper Sonoran (Transition). Plant Communities: Wet Meadow, Marsh. Host Plants: VIOLACEAE: *Viola* (Violet).

10a. *Argynnis* (*Speyeria*) *zerene zerene* Bdv. **Pl. I, fig. b**
b. *Argynnis* (*Speyeria*) *zerene malcolmi* Comst.

THE ZERENE FRITILLARY is common along Highway 41 from Chinquapin to Wawona, in the Mariposa and Tuolumne Big Tree groves, and at Mather and Hetch-Hetchy summit. Every patch of thistle will bear investigation, for this fritillary is highly susceptible to its lure. Its Sierran east-slope counterpart, MALCOLM'S FRITILLARY, is found along the road from Highway 395 to Mammoth, and at Warren Creek on the Tioga Road. Its first choice for nectar is *Monardella,* a dwarf mint.

Life Zones: Transition, Canadian. Plant Communities: Yellow Pine, White Fir (Red Fir), Mixed Coniferous forests for *A. z. zerene,* Sagebrush Scrub, Jeffrey Pine Forest, Piñon-Juniper, and Juniper Woodland for *A. z. malcolmi.* Host Plants: VIOLACEAE: *Viola* (Violet).

11a. *Argynnis* (*Speyeria*) *callippe inornata* Edw.
b. *Argynnis* (*Speyeria*) *callippe nevadensis* Edw. **Pl. IV, fig. b**

THE PLAIN FRITILLARY flies in the western foothills of the Yosemite region in the late spring. It has been found at Fish Camp,

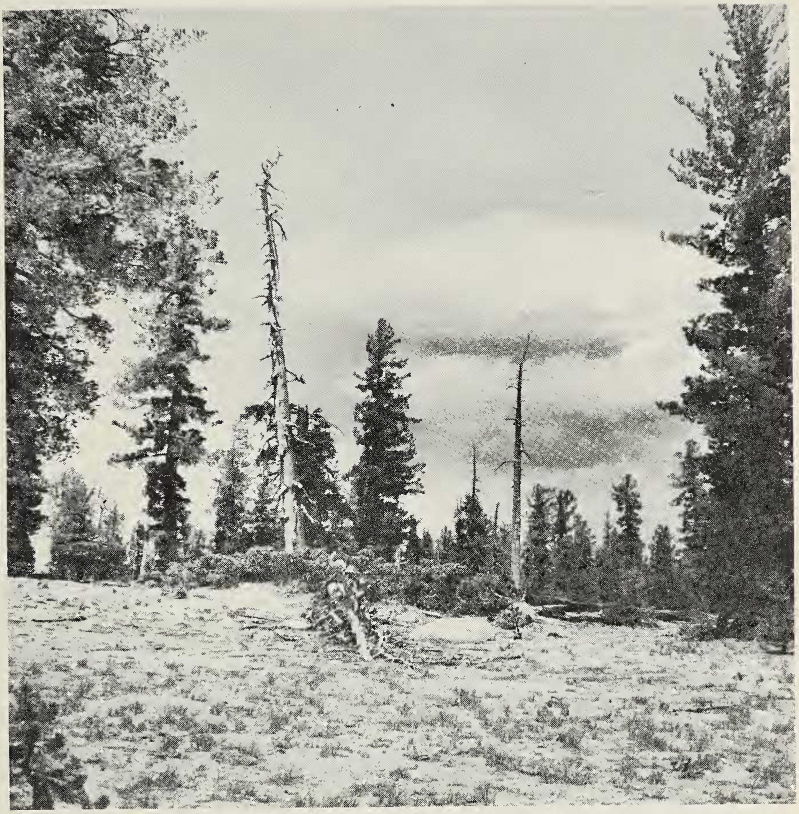


Fig. 4. Research Reserve, el. 8,700 ft. Open slope with Western White Pine predominant; Lodgepole Pine and Red Fir also present, with understory of Manzanita and Huckleberry Oak. Canadian life zone. *Philotes battoides* and *P. shasta comstockii* hover over the dwarf buckwheat and sparse grasses *ruralis* may be seen here.—Neva Snell.

at Briceburg, and at Indian Flat, below El Portal. THE NEVADA FRITILLARY, its eastern Sierran counterpart, flies in the Mono Lake region in early summer. It has been found at the summit above Crowley Lake on Balsam Root (*Balsamorhiza*), a large-leaved composite. The Great Basin races of *callippe* tend to be green and silvered below, the races of the western foothills brown and unsilvered.

Life Zones: Upper Sonoran (lower Transition). Plant Communities: (Chaparral) Foothill Woodland, Yellow Pine and Mixed Forest for *A. c. inornata;* Sagebrush, Piñon-Juniper Woodland, Jeffrey Pine Forest openings, Juniper Woodland for *A. c. nevadensis.* Host Plants: VIOLACEAE: *Viola* (Violet).

12. *Argynnis (Speyeria) egleis* Behr
Syn. *Argynnis (Speyeria) montivaga* Behr

THE EGLEIS FRITILLARY, known for many years as THE MOUNTAIN VAGABOND, is a species of uniformly small size characterized by a slight thickening of the veins of the primaries. It flies with The Arge Fritillary at Tioga Pass and is common at all elevations above 6,000 feet, preferring the minted slopes, whereas *A. mormonia arge* prefers the meadows. On the west slope of Mt. Dana it fairly swarms in the late afternoon sunlight.

Life Zones: upper Transition, Canadian, Hudsonian (Arctic-Alpine). Plant Communities: Openings in Mixed Coniferous, White and Red Fir, and Lodgepole Pine Forests (Alpine Fell-Fields). Host Plants: VIOLACEAE: *Viola* (Violet).

13. *Argynnis (Speyeria) atlantis irene* Bdv. Pl. II, fig. h

THE IRENE FRITILLARY of Yosemite, as determined for the earlier survey by Dr. J. McDunnough, is a dark race, some specimens of which are strongly suggestive of The Hydaspe Fritillary. *Irene,* however, is found at elevations well above those at which *hyaspe* occurs, and for this reason should not be confused with it. One of us (Tilden) has taken it also on the Sonora Pass Road, between Strawberry and the Clark Fork Road. In Yosemite it is something of a rarity.

Life Zones: upper Transition, Canadian. Plant Communities: Yellow Pine-Sugar Pine, White Fir and Red Fir Forests. Host Plants: VIOLACEAE: *Viola* (Violet).

14. *Argynnis (Speyeria) hydaspe* Bdv.

THE HYDASPE FRITILLARY first appears in Yosemite Valley about the Fourth of July, flying rapidly across the valley floor but pausing over the *Monardella* of the talus slopes. It is completely unsilvered and the creamy spots on the under side give a "checker-board" effect quite different from the purplish shades and frequent light silvering of the somewhat similar but usually larger *zerene.*

Life Zones: Transition, lower Canadian. Plant Communities: Yellow Pine, Mixed Coniferous, and White Fir Forests. Host Plants: VIOLACEAE: *Viola* (Violet).

15. *Argynnis* (*Speyeria*) *mormonia arge* Stkr. Pl. III, fig. 1

The Sierran race of THE MORMON FRITILLARY flies with THE EGLEIS FRITILLARY throughout the park. Males lack the enlarged veins of the forewing; females are more finely marked than those of *egleis;* otherwise the two species are indistinguishable, and particularly so when on the wing. The active males range widely, but the females will be found near moist meadows. The Rocky Mountain race of *A.* (*S.*) *mormonia* is *eurynome* Edw.

Life Zones: Canadian, Hudsonian (Arctic-Alpine). Plant Communities: Sub-alpine Meadows; Alpine Fell-Fields, Meadow and Grassland. Host Plants: VIOLACEAE: *Viloa* (Violet).

16. *Boloria* (*Clossiana*) *epithore* (Edw.) Pl. II, fig. d

THE WESTERN MEADOW FRITILLARY favors small, open glades beneath fir trees. Along Yosemite Creek it is particularly abundant in mid-July. There is also a colony on Dana Trail, where it passes through a marsh before rising sharply onto the slope of the mountain. The under side of the secondaries resembles *Boloria* (*C.*) *toddi* (Holl.), a widely ranging eastern species; however, in *epithore* the outer margin of the primaries is rounded, whereas in *toddi* it appears square-cut.

Life Zones: Canadian (Hudsonian). Plant Communities: White and Red Fir Forest; Bogs and Marshes. Host Plants: VIOLACEAE: *Viola* (Violet).

17a. *Euphydryas chalcedona chalcedona* (Dbldy. & Hew.)
b. *Euphydryas chalcedona sierra* (Wgt.)

THE CHALCEDON CHECKER-SPOT ranges throughout the foothills of the western portion of the state, being replaced in the Sierran highlands by THE SIERRA CHECKER-SPOT, now recognized, through the work of J. D. Gunder (1929), as a subspecies, or geographical race. Typical *chalcedona* may be found abundantly among the chaparral-clothed foothills, whereas race *sierra* prefers the wooded glades of the evergreen belt. A variety of food plants is acceptable to the voracious larvae.

Life Zones: Upper Sonoran for *E. c. chalcedona;* Canadian for *E. c. sierra.* Plant Communities: Foothill Woodland, Chaparral for *E. c. chalcedona;* Fir Forest for *E. c. sierra.* ·Host Plants: SCROPHULARIACEAE: *Scrophularia* (Bee Plant); *Pentstemon* (Pentstemon); *Castilleja* (Paint Brush); *Mimulus* (Monkey Flower); and *Diplacus* (Sticky Monkey Flower) for *E. c. chalcedona;* BORAGINACEAE: *Mertensia ciliata* var. *stomatechoides* (Mertensia), for *E. c. sierra,* according to Davenport and Dethier (1937). CAPRIFOLIACEAE: *Symphoricarpos albus* (Snow Berry) for *E. c. chalcedona.*

18a. *Euphydryas editha rubicunda* (Hy. Edw.) Pl. I, fig. d
b. *Euphydryas editha nubigena* (Behr) Pl. III, fig. c
c. *Euphydryas editha monoensis* Gund. Pl. IV, fig. f

THE RUDDY CHECKER-SPOT flies in the western Sierra from

Tulare to Sierra counties, its "lowland" counterpart of the eastern Sierra being THE MONO CHECKER-SPOT. As suggested by Comstock (1927), and confirmed by Gunder (1929), THE CLOUD-BORN CHECKER-SPOT, *E. nubigena,* has proven to be a delicately marked dwarf form that has adapted itself to alpine areas. All are subspecies of the widely ranging *Euphydryas editha* Bdv., each with a well defined and mutually exclusive range of its own.

Life Zones: Upper Sonoran, Transition for *E. e. rubicunda* and *E. e. monoensis;* Hudsonian, Arctic-Alpine for *E. e. nubigena.* Plant Communities: Foothill Woodland for *E. e. rubicunda;* Piñon-Juniper Woodland for *E. e. monoensis;* Alpine Fell-Fields for *E. e. nubigena.* Host Plants: PLANTAGINACEAE: *Plantago* (Plantain).

19. *Melitaea (Chlosyne) damoetas malcolmi* Comst.
Pl. III, fig. a

MALCOLM'S CHECKER-SPOT was described from the then only known colony at Red Lake, el. 11,000 ft., above the Mammoth Lakes Basin, where it flies on a precipitous talus slide. It is now known to fly in the Yosemite region and throughout the central Sierra at corresponding elevations. Perhaps the most intimate knowledge of the species is possessed by Oakley Shields, who has combed the high country for isolated colonies. The most accessible of these is located above Upper Gaylor Lake near an abandoned stone cabin reached by a fisherman's trail from Tioga Pass.

Life Zones: upper Hudsonian, Arctic-Alpine. Plant Communities: Alpine Fell-Fields. Host Plants: Not known. Possibly COMPOSITAE: *Aster* (Aster).

20. *Melitaea (Chlosyne) acastus* Edw.

THE ACASTUS CHECKER-SPOT is a Great Basin flier, found sparingly around Mono Lake. The few records from late June and early July suggest an earlier flight season.

Life Zones: Upper Sonoran. Plant Communities: Sagebrush Scrub, Meadowland. Host Plants: COMPOSITAE: *Aster* (Aster).

21a. *Melitaea (Chlosyne) palla palla* Bdv. Pl. II, fig. j
b. *Melitaea (Chlosyne) palla whitneyi* Behr

THE NORTHERN CHECKER-SPOT ranges widely throughout the Sierra Nevada and Cascade chains as well as the Rockies. It is replaced at higher elevations in the southern Sierra by WHITNEY'S CHECKER-SPOT, a darker and ruddier form. Whether *whitneyi* actually occurs in the Yosemite region is a matter for further investigation. None were encountered in the course of the present survey.

Life Zones: Upper Sonoran, Transition, Canadian for *M.* (*C.*) *p. palla;* Hudsonian for *M.* (*C.*) *palla whitneyi.* Plant Communities: Foothill Woodland, Chaparral, Mixed Evergreen Forest. Host Plants: COMPOSITAE: *Aster* (Aster).

22. *Melitaea* (*Chlosyne*) *hoffmanni* Behr Pl. II, fig. 1

HOFFMANN'S CHECKER-SPOT was the most abundant butterfly on the Research Reserve in 1933. They fairly swarmed over *Monardella,* the nectar seeming to intoxicate, or at least render them oblivious to the observer's presence. In 1956 but a few were seen on a north-facing slope along the Tioga Road opposite the White Wolf turnoff.

Life Zones: Canadian. Plant Communities: Openings in Fir Forest. Host Plants: Not known.

23. *Melitaea* (*Chlosyne*) *leanira* F. & F.

THE LEANIRA CHECKER-SPOT invades the western portions of the park from the foothills east of the San Joaquin Valley, where it properly inhabits the chaparral. It is common at Indian Flat, below El Portal.

Life Zones: Upper Sonoran (Transition). Plant Communities: California Sagebrush Scrub (also called Coastal Sage Scrub), Foothill Woodland. Host Plants: SCROPHULARIACEAE: *Castilleja* (Indian Paint Brush), *Cordylanthus tenuis* (Bird's Beak).

24a. *Phyciodes* (*Phyciodes*) *campestris campestris* (Behr)
b. *Phyciodes* (*Phyciodes*) *campestris montana* (Behr)

THE FIELD CRESCENT is found about moist places at lower elevations, as on the floor of Yosemite Valley, or at Mather, just outside the park. Higher up it grades imperceptibly into THE MOUNTAIN CRESCENT, in which the tawny ground color has all but obliterated the submarginal row of spots on the secondaries. Although heretofore treated as a distinct species, on the basis of Yosemite specimens the present authors prefer to consider *montana* but an altitudinal race of *campestris.* Specimens from Mono Lake are clearly intermediate.

Life Zones: Upper Sonoran, Transition for *P.* (*P.*) *c. campestris;* Canadian, lower Hudsonian for *P.* (*P.*) *c. montana.* Plant Communities: Several. Wet Meadowland, Roadside Associations. Host Plants: COMPOSITAE: *Aster* (Aster).

25. *Phyciodes* (*Phyciodes*) *mylitta* (Edw.) Pl. II, fig. c

THE MYLITTA CRESCENT frequents the streamside and moist meadows, often in association with the following species, *Polygonia satyrus* (Edw.). It can be recognized by the bright yellow-brown ground color. California specimens are typical, that is to say, darker, whereas Rocky Mountain specimens incline toward the lighter races *Phyciodes* (*P.*) *mylitta pallida* Edw. and *thebais* (G. & E.).

Life Zones: Upper Sonoran, Transition, Canadian. Plant Communities: Several, as is frequent with wide-ranging species. Host Plants: COMPOSITAE: *Carduus* (Italian Thistle), *Cirsium* (Native Thistle), and *Silybum* (Milk Thistle).

26. *Polygonia satyrus* (Edw.)

THE SATYR is a streamside flier that alights on the trunks of

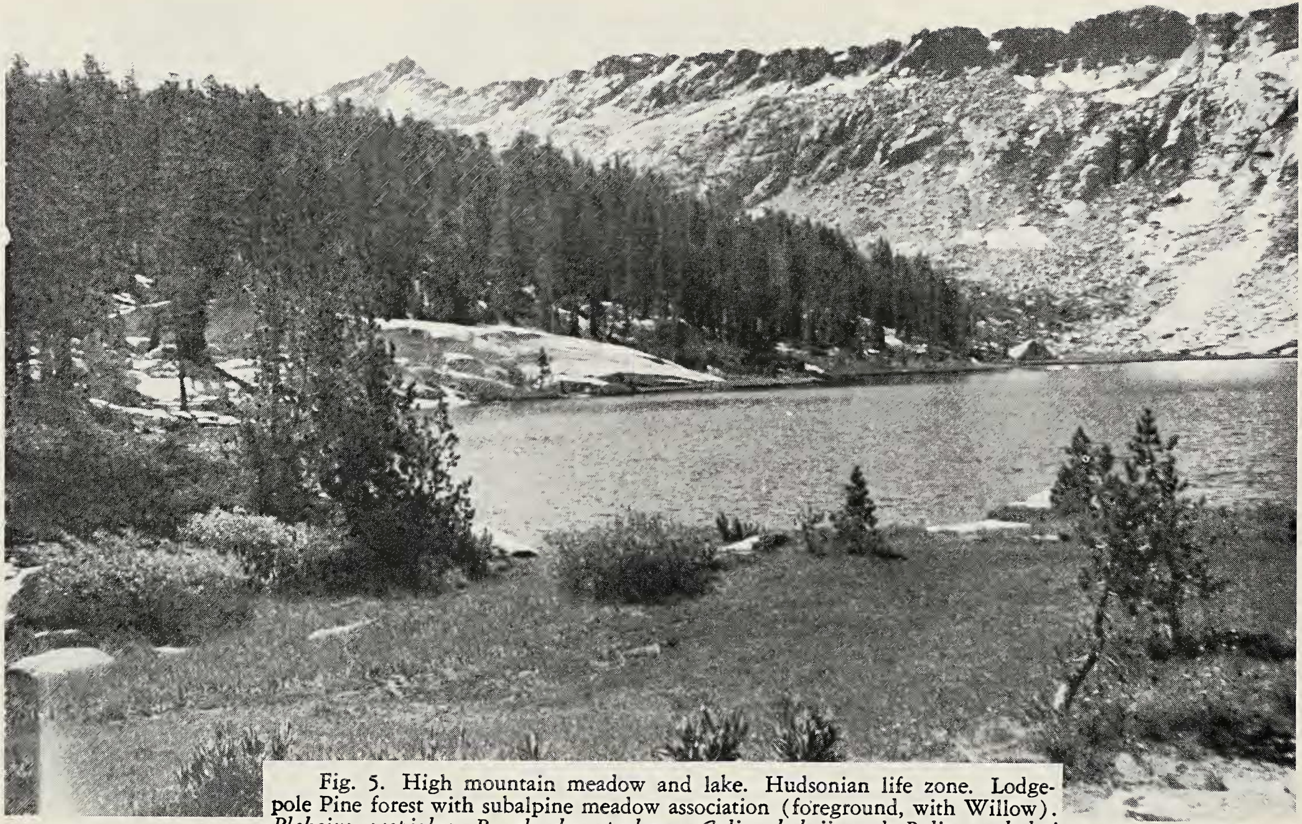


Fig. 5. High mountain meadow and lake. Hudsonian life zone. Lodgepole Pine forest with subalpine meadow association (foreground, with Willow). *Plebejus saepiolus*, *P. glandon podarce*, *Colias behrii*, and *Polites sabuleti tecumseh* fly here, as does *Argynnis mormonia arge* in late season.—Joseph S. Dixon.

Alder, Willow, and Cottonwood, to blend indistinguishably with the mottled bark.

Life Zones: Upper Sonoran, Transition. Plant Communities: Foothill Woodland, Mixed Coniferous Forest, and others. Riparian Association. Host Plants: URTICACEAE: *Urtica* (Nettle).

27. ***Polygonia faunus rusticus*** (Edw.)

THE RUSTIC ANGLE-WING occurs principally north of Yosemite, but may be looked for wherever Azalea grows. Its inclusion in the Yosemite fauna is based on an early record of Dr. E. O. Essig. The specimen was seen by the senior author at the Yosemite Museum in 1933.

Life Zones: Transition. Plant Communities: Several. Moist Woodland, Riparian associations. Host Plants: ERICACEAE: *Rhododendron* (Azalea); SAXIFRAGACEAE: *Ribes* (Currant, Gooseberry); BETULACEAE: *Alnus* (Alder); SALICACEAE: *Salix* (Willow).

28. ***Polygonia zephyrus*** (Edw.) **Pl. II, fig. k**

THE ZEPHYR replaces THE SATYR (*Polygonia satyrus*) as the common Angle-Wing of the Canadian and Hudsonian zones, its pale gray underside serving as a distinguishing feature. Yosemite Creek in mid-July is a typical situation for the species. Its food plant, *Ribes,* is a common shrub in the Subalpine Forest.

Life Zones: Transition (upper), Canadian, Hudsonian. Plant Communities: Fir Forest, Lodgepole Pine Forest, Subalpine Forest. Host Plants: ERICACEAE: *Rhododendron* (Azalea); SAXIFRAGACEAE: *Ribes* (Currant, Gooseberry).

29. ***Nymphalis californica*** (Bdv.)

THE CALIFORNIA TORTOISE-SHELL appears in outbreak numbers every few years throughout the Sierra. The June flights observed by the senior author in General Grant (now Sequoia-Kings Canyon) National Park in 1922, in the San Bernardino Mountains in 1931, and in Yosemite in 1933 were all in a northerly or northwesterly direction, roughly paralleling the axis of the Sierra. However, former Park Naturalist C. A. Harwell, while on a glacier-measuring survey, reported a return flight on October 4, 1933, in which myriads of the insects passed through the highest mountain passes, all heading south. The duration of the spring flight is but a few days. It begins at dawn and lasts until after sundown. At times the greatest density of the insects appears to be at tree-top level; again they come so near the ground that they may be knocked down with a hat. A few weeks later the *Ceanothus* is matted with webs of the gregarious larvae. Complete defoliation over large areas results. The investigation of such an outbreak was the first professional assignment of Dr. H. C. Bryant, co-founder of the Yosemite Field School. Observations by Edwards and Behr before 1900 in the Mill Valley section are mentioned by C. B. Williams in his monograph on butterfly migration. One of us (Tilden) has observed this phenomenon in Yosemite as recently as 1961. The explanation seems to be that the CALIFORNIA TORTOISE-SHELL is a swarming species which, like the lemming, has cycles of abundance followed by a drastic reduction in the population, due to causes as yet not fully understood.

Life Zones: Unrestricted in flight, although the food plant does not occur above Canadian. Host Plants: RHAMNACEAE: *Ceanothus,* particularly *C. cordulatus* (Snow-Bush), and other smooth-leaved species.

30. *Nymphalis milberti furcillata* (Say)

MILBERT'S TORTOISE-SHELL has an inward urge to fly upward, and has been seen at the very summit of Mt. Lyell, el. 13,090 ft., the highest point in Yosemite. Form *subpallida* (Ckll.) flies with normal individuals, although not commonly. The subspecific designation *furcillata* (Say) is considered applicable to all western specimens south of Oregon.

Life Zones: Transition, Canadian, straying higher. Host Plants: URTICACEAE: *Urtica* (Nettle).

31. *Nymphalis antiopa* (Linn.)

THE MOURNING CLOAK is one of the world's most widespread butterflies, occurring in Europe, northern Asia, and Japan. In England it is called The Camberwell Beauty.

Life Zones: Unrestricted. Host Plants: SALICACEAE: *Salix* (Willow); *Populus* (Poplar, Cottonwood); ULMACEAE: *Ulmus* (Elm).

32. *Vanessa atalanta* (Linn.)

THE ALDERMAN or THE RED ADMIRAL is found in Europe and Japan, as well as in North America. Few butterflies are easier to recognize by sight.

Life Zones: Upper Sonoran, Transition. Host Plants: URTICACEAE: *Urtica* (Nettle), *Boehmeria* (False Nettle), *Parietaria* (Pellitory).

33. *Vanessa virginiensis* (Dru.)

THE VIRGINIA LADY is widely distributed throughout North America and may be recognized by the large eye-spots on the under surface of the hind wings.

Life Zones: Upper Sonoran, Transition, Canadian. Host Plants: COMPOSITAE: *Gnaphalium* (Cudweed; Everlasting), *Anaphalis* (Everlasting, *Antennaria* (Everlasting), *Artemesia heterophylla* (Mugwort).

34. *Vanessa cardui* (Linn.)

THE PAINTED LADY or THE THISTLE BUTTERFLY is probably the most cosmopolitan of butterflies. Native to the Northern Hemisphere, it has been introduced elsewhere.

Life Zones: Unrestricted. Host Plants: BORAGINACEAE: *Amsinckia* (Fiddle-Neck), *Crypantha* (Nievitas); COMPOSITAE: *Carduus* (Italian Thistle), *Cirsium* (Native Thistle), *Silybum* (Milk Thistle).

35. *Vanessa carye* (Hbn.)

THE WEST COAST LADY is restricted to the western United

States, where it is more common in back yards and vacant lots than in the out-of-doors.

Life Zones: Unrestricted. Host Plants: MALVACEAE: *Malva* (Mallow), *Lavatera* (Tree Mallow), *Sida* (Alkali Mallow), *sidalcea* (Checkerbloom, Wild Hollyhock), *Sphaeralcea* (=*Malvastrum*) (Apricot Mallow, Bush Mallow).

36. ***Precis orithya evarete* (Cram.)**
Syn. *Junonia coenia* Hbn.

THE BUCKEYE may be recognized by the brightly colored eyespots on all wings. The aggressive males have been known to select a perch and defend a "territory".

Life Zones: Upper Sonoran, Transition, (lower Canadian). Host Plants: PLANTAGINACEAE: *Plantago* (Plantain); SCROPHULARIACEAE: *Mimulus* (Monkey Flower).

37. ***Limenitis* (*Limenitis*) *weidemeyerii nevadae* (B. & B.)**
Pl. IV, fig. h

THE NEVADA ADMIRAL is a Great Basin race of the Rocky Mountain Weidemeyer's Admiral, *Limenitis* (*L.*) *weidemeyerii* (Edw.), found at Mono Lake on the eastern side of the Sierra Nevada. At Lee Vining, where its range overlaps that of the following species, *L.* (*L.*) *lorquini* Bdv., the hybrid *L.* (*L.*) *fridayi* (Gund.) occurs. Since the blend is an even one, in which the characteristics of neither species predominate, we would prefer to indicate it as *L. w. nevadae* × *L. lorquini*, rather than as a form of the above.

Life Zones: Upper Sonoran, Transition. Plant Communities: Several. Aspen Grove, Willow Thicket, Riparian Associations. Host Plants: SALICACEAE: *Populus* (Aspen, Cottonwood), *Salix* (Willow).

38. ***Limenitis* (*Limenitis*) *lorquini* Bdv. Pl. II, fig. b**

LORQUIN'S ADMIRAL adheres to the riparian association throughout three life zones, seldom straying from the willows and poplars of the stream bed. On the wing it is sometimes confused with the following species, but the manner of flight is quite different.

Life Zones: Upper Sonoran, Transition, Canadan. Plant Communities: Several. Aspen Grove, Willow Thicket and Riparian Associations. Host Plants: SALICACEAE: *Salix* (Willow), *Populus* (Aspens and Cottonwoods). ROSACEAE: *Prunus* (Choke-cherry).

39. ***Limenitis* (*Adelpha*) *bredowii californica* (Butl.)**
Pl. I, fig. g

THE CALIFORNIA SISTER flies with the foregoing species, which it superficially resembles, but from which it may be told on the wing by the habit of alternating a few rapid beats with a glide in which the wings are held slightly below the horizontal level. Unlike LORQUIN'S ADMIRAL, however, THE CALIFORNIA SISTER forsakes the stream margins for the hot canyon walls and the Golden Cup Oak association. No other insect is so likely to attract the attention of the park visitor.

Life Zones: Upper Sonoran, Transition, Canadian. Plant Communities: Oak Woodland, Mixed Evergreen Forest. Host Plants: FAGACEAE: *Quercus* (Oak), especially *Quercus chrysolepis* (Golden Cup Oak, Maul Oak).

40a. ***Apodemia mormo mormo*** **(F. & F.)**
b. ***Apodemia mormo tuolumnensis*** **Opler & Powell**

THE MORMON METAL-MARK is found at higher elevations and on the east Sierran slope. THE TUOLUMNE METAL-MARK is known only from Pate Valley in the Grand Canyon of the Tuolumne, the type locality. It is "a Sierran population characterized by a great extent of orange on the upper side together with reduction of white spots and dark under side. So far as is known it is restricted to a population along a four mile area of the Pate Valley Trail from about 4500' to 7000'. It is likely a segregate from *virgulti,* its nearest geographic relative, which probably occurs in scattered colonies through the lower foothills to the west." (Opler and Powell, 1961) BEHR'S METAL-MARK, *Apodemia mormo virgulti* (Behr), is the near relative.

Life Zones: Upper Sonoran (Transition) for *A. m. tuolumnensis;* to Hudsonian for *A. m. mormo.* Plant Communities: Chaparral for *A. m. tuolumnensis;* Sagebrush Scrub and Piñon-Juniper Woodland for *A. m. mormo.* Host Plants: POLYGONACEAE: *Eriogonum* (Buckwheat), perennial species only.

LYCAENIDAE

41. ***Habrodais grunus*** **(Bdv.)** Pl. I, fig. h

BOISDUVAL'S HAIR-STREAK is noted for its crepuscular habits. A party of the Yosemite Field School, on its way to the Research Reserve, discovered it flying at Columbia Point before 5 a.m. in semi-darkness. It continues to hover above the live oaks after the last rays of sunlight have left the canyon walls.

Life Zones: Transition (Canadian). Plant Communities: Oak Woodland, Chaparral. Host Plants: FAGACEAE: *Quercus chrysolepis* (Golden Cup Oak, Maul Oak); *Castanopsis* (Chinquapin) suspected.

42. ***Atlides halesus estesi*** **Clench**

THE GREAT BLUE HAIR-STREAK displays a metallic blue of dazzling luster on the superior surfaces. Rarely encountered north of Tehachapi, it has been found several times in Yosemite since the capture by a small boy of the specimen recorded by Garth (1935). The worn condition of Yosemite specimens suggests flight from lower elevations, perhaps outside the park.

Life Zones: Upper Sonoran (Transition, Canadian). Plant Communities: Foothill Woodland. Host Plants: LORANTHACEAE: *Phoradendron* (Mistletoe), male flowers only.

43. ***Strymon (Strymon) melinus pudica*** **(Hy. Edw.)**

THE COMMON HAIR-STREAK flies in the Museum garden and throughout the lower elevations of the park. It is the western race *pudica,* the only race that flies in California.

Life Zones: Upper Sonoran (Transition). Plant Communities: Several. Host Plants: BORAGINACEAE: *Cynoglossum* (Hound's Tongue). LEGUMINOSAE: *Astragalus* (Loco Weed, Rattle Weed), *Hosackia* (=*Lotus*), *Lupinus* (Lupine). MALVACEAE: *Malva* (Mallow). POLYGONACEAE: *Polygonum* (Knot Weed). GUTTIFERAE: *Hypericum* (St. John's Wort). LABIATAE: *Hyptis* (Bee Sage).

44. ***Strymon* (*Satyrium*) *fuliginosum semiluna* (Klots)** **Pl. IV, fig. j**

THE SEMI-LUNATE GOSSAMER WING is an early season flier at Mono Lake. Like *Melitaea* (*Chlosyne*) *acastus,* it has been found in late June, but is probably on the wing a month earlier.

Life Zones: Upper Sonoran. Plant Communities: Sagebrush Scrub. Host Plants: LEGUMINOSAE: *Lupinus* (Lupine).

45. ***Strymon* (*Satyrium*) *behrii* (Edw.)** **Pl. IV, fig. g**

BEHR'S HAIR-STREAK is characteristic of the dry eastern slopes of the Sierra Nevada. An isolated colony also exists on the desert slope of the San Bernardino Mountains, in southern California..

Life Zones: Upper Sonoran. Plant Communities: Sagebrush Scrub. Host Plants: LEGUMINOSAE: *Lupinus* (Lupine), *Lotus* (=*Hosackia*), *Astragalus* (Loco Weed, Rattle Weed). ROSACEAE: *Purshia tridentata* (Antelope Brush, Bitter Brush), reported (1963).

46. ***Strymon* (*Satyrium*) *auretorum* (Bdv.)** **Pl. I, fig. k**

THE GOLDEN HAIR-STREAK may now be reported authoritatively from the Yosemite region on the strength of specimens found during the present survey along Hetch-Hetchy Road north of Mather. When compared with specimens of The Nut-Brown Hair-Streak, *Strymon* (*Satyrium*) *auretorum spadix* (Hy. Edw.), from Crystal Lake in the San Gabriel Mountains of southern California, they proved to be noticeably different in hue and marking. Specimens were attracted to Syringa, *Philadelphus Lewisii* var. *californicus,* to the fragrant blooms of which the Theclinae are partial.

Life Zones: Upper Sonoran. Plant Communities: Chaparral. Host Plants: FAGACEAE: *Quercus* (Oak), especially *Q. Douglassii* (Blue Oak) in the Sierra foothills.

47. ***Strymon* (*Satyrium*) *saepium* (Bdv.)**

THE HEDGE-ROW HAIR-STREAK is abundant on the blossoms of the Buckeye, *Aesculus californicus,* in the late afternoon, where it flies with *Strymon* (*Satyrium*) *auretorum* and *Euphydryas chalcedona.*

Life Zones: Upper Sonoran. Plant Communities: Chaparral (west slope); Sagebrush Scrub (east slope). Host Plants: RHAMNACEAE: *Ceanothus,* especially *C. cuneatus* (Buck Brush). ROSACEAE: *Cercocarpus* (Mountain Mahogany).

48. ***Strymon* (*Satyrium*) *adenostomatis* (Hy. Edw.)**

THE GRAY HAIR-STREAK occurs in the western foothills near Jerseydale and along the road to Hetch-Hetchy, above Mather.

Life Zones: Upper Sonoran. Plant Communities: Chaparral. Host

Plants: ROSACEAE: *Cercocarpus,* especially *C. betuloides* (Hard Tack, Mountain Mahogany). Not *Adenostoma* (Chamise Bush), as its name would imply.

49. *Strymon (Satyrium) sylvinus* (Bdv.)

THE SYLVAN HAIR-STREAK is found about the willows of the stream bed, rather than in forest glades, as the name might suggest. Specimens from Mono Lake show no great tendency toward race *desertorum* (Grin.), which occurs from Kern County north through Owens Valley.

Life Zones: Upper Sonoran (lower Transition). Plant Communities: Several. Riparian Association. Host Plants: SALICACEAE: *Salix* (Willow).

50. *Strymon (Satyrium) californica* (Edw.)

THE CALIFORNIA HAIR-STREAK is partial to the flowers of Pink Pussy-Paws, *Spraguea umbellata,* from which it may be plucked with fingers or with forceps. It is also attracted to Yerba Santa, *Eriodictyon californicum,* when it visits the nature garden behind the Yosemite Museum.

Life Zones: Upper Sonoran (lower Transition) on west slope; Upper Sonoran and High (arid) Transition on east slope. Plant Communities: Chaparral, Oak Woodland (west slope); Sagebrush Scrub, Juniper Woodland (east slope). Host Plants: RHAMNACEAE: *Ceanothus cuneatus* (Buck Brush). ROSACEAE: *Cercocarpus* (Mountain Mahogany). Possibly FAGACEAE: *Quercus* (Oak).

51. *Strymon (Satyrium) dryope* (Edw.)

THE DRYOPE HAIR-STREAK was encountered playing about sage at Mono Lake.

Life Zones: Upper Sonoran. Plant Communities: Sagebrush Scrub (east slope); Chaparral, Foothill Woodland (coastal California). Riparian Association. Host Plants: SALICACEAE: *Salix* (Willow).

52. *Callophrys (Callophrys) dumetorum* (Bdv.)

THE BRAMBLE HAIR-STREAK is the green hair-streak of moderate elevations on the western slope of the Sierra Nevada. At high elevations, and on the eastern slope, it is replaced by the following species.

Life Zones: Upper Sonoran. Plant Communities: Chaparral. Host Plants: POLYGONACEAE: *Eriogonum* (Buckwheat), especially *E. nudum.*

53. *Callophrys (Callophrys) lemberti* Tilden Pl. III, fig. k

LEMBERT'S HAIR-STREAK is the greenish hair-streak of the higher elevations of the park. Its relationships appear to be with *Callophrys (C.) sheridani* Edw. of the Rocky Mountains, in which the band of white across the under side of the secondaries is more or less continuous. Discovered during the course of this survey, it has been named in honor of the pioneer resident of Tuolumne Meadows, John Batiste Lembert.

Life Zones: Hudsonian, Arctic-Alpine. Plant Communities: Alpine Fell-Fields. Associated with "rock garden" *Eriogonum, E. ovalifolium.* Host Plants: Unknown.

54. *Callophrys* (*Mitoura*) *spinetorum* (Hew.)

THE THICKET HAIR-STREAK is a highly prized find that may be recognized by the bold white line across the under side of the secondaries. Its dull bluish upper side distinguishes it from the following *Callophrys* (*Mitoura*) *johnsoni* (Skin.).

Life Zones: Transition, Canadian. Plant Communities: Mixed Coniferous Forest, White Fir Forest, Red Fir Forest. Host Plants: LORANTHACEAE: *Arceuthobium* (Dwarf Mistletoe), a genus occurring on conifers.

55. *Callophrys* (*Mitoura*) *johnsoni* (Skin.) **Pl. I, fig. l**

JOHNSON'S HAIR-STREAK, a close relative of *Callophrys* (*Mitoura*) *spinetorum,* may be told from the latter by means of its brownish upper side. The species is a prize over all of its range, but occurs more frequently in the Yuba Pass-Gold Lake area of Sierra County, California, and in the Pacific Northwest.

Life Zones: Transition, Canadian. Plant Communities: Coniferous Forest. Host Plants: LORANTHACEAE: *Arceuthobium Douglassii* (Dwarf Pine Mistletoe).

56. *Callophrys* (*Mitoura*) *nelsoni* (Bdv.) **Pl. I, fig. i**

NELSON'S HAIR-STREAK, like The California Hair-Streak, occurs in the nature garden behind the Yosemite Museum. Both swarm over the pink clusters of *Spraguea* (Pussy Paws) and may be picked off by forceps. They may also be found at Jerseydale, at the junction of Highway 120 with Hetch-Hetchy Road, and on the warm road-shoulders above Tamarack Flat.

Life Zones: Transition, Canadian. Plant Communities: Mixed Coniferous Forest. Host Plants: PINACEAE: *Libocedrus decurrens* (Incense Cedar), probably.

57. *Callophrys* (*Incisalia*) *doudoroffi windi* (Clench) **Pl. I, fig. j**

WIND'S ELFIN was encountered at a damp spot in the trail near Indian Flat, where it was flying with the following species. It differs from normal *doudoroffi* of the Monterey Coast in being much lighter and less heavily banded below. Males are slaty gray above and brown beneath; females are quite golden in color. The form has not been illustrated previously.

Life Zones: Upper Sonoran. Plant Communities: Chaparral. Host Plants: Not known. Perhaps CRASSULACEAE: *Sedum* (Stonecrop), as for the related *C.* (*I.*) *fotis.*

58. *Callophrys* (*Incisalia*) *iroides* (Bdv.)

THE WESTERN ELFIN is one of the first butterflies to emerge in the spring. March finds it on the wing in the foothills of the San Joaquin Valley. It is a very plain, brown elfin. The larvae are probably bud-feeders, like those of *Celastrina argiolus echo* (Edw.).

Life Zones: Upper Sonoran (lower Transition), occasionally to Canadian. Plant Communities: Chaparral, and the chaparral-like understory of coniferous forests. Host Plants: CONVOLVULACEAE: *Cuscuta* (Dodder). RHAMNACEAE: *Ceanothus* (Buck Brush, Wild Lilac). ERICACEAE: *Arbutus* (Madroño), *Arctostaphylos* (Manzanita), *Vaccinium* (Bilberry). Perhaps CRASSULACEAE: *Sedum* (Stonecrop).

59. *Callophrys (Incisalia) eryphon* (Bdv.)

THE WESTERN BANDED ELFIN clings quite constantly to the coniferous forest. Never common, its discovery gives cause for comment.

Life Zones: Transition, Canadian, lower Hudsonian. Plant Communities: Yellow Pine, Red Fir, and Lodgepole Pine Forest. Host Plants: PINACEAE: *Pinus ponderosa* (Yellow Pine), *P. contorta Murrayana* (Lodgepole Pine).

60a. *Lycaena (Tharsalea) arota arota* (Bdv.)

b. *Lycaena (Tharsalea) arota virginiensis* (Edw.)

THE AROTA COPPER and THE NEVADA COPPER occupy the western and eastern slopes of the Sierra Nevada, respectively. The former was found in Pate Valley by Edmund Godwin on California Laurel, *Umbellularia californica;* the latter occurs at Mono Lake and at Bodie where specimens seem almost indistinguishable from those from Virginia City, Nevada, the type locality.

Life Zones: Upper Sonoran, Transition. Plant Communities: Mixed Evergreen Forest (west slope); Juniper Woodland, Sagebrush Scrub (east slope). Host Plants: SAXIFRAGACEAE: *Ribes* (Currant), *Grossularia* (Gooseberry). The overwintering eggs are deposited at the bases of thorns.

61. *Lycaena (Lycaena) gorgon* (Bdv.)

THE GORGON COPPER flies in the foothills surrounding the western approaches to the park. Single brooded, it is on the wing during late spring and early summer, when it may be expected to occur as a vagrant within the park boundaries.

Life Zones: Upper Sonoran. Plant Communities: Foothill Woodland, Chaparral. Host Plants: POLYGONACEAE: *Eriogonum* (Buckwheat), especially *E. nudum.*

62. *Lycaena (Lycaena) heteronea* Bdv.

THE VARIED BLUE is common on the east slope of the Sierra Nevada. It has been found west of the divide in the sagebrush zone above the subalpine forest between Tioga Pass Checking Station and the summit of Gaylor Lakes Trail. It is also sometimes common below Tuolumne Meadows on the way to Return Creek, below Glen Aulin.

Life Zones: Hudsonian (in Yosemite). Plant Communities: Sagebrush Scrub, often where mixed with Pine Forest or Juniper Woodland.

Host Plants: POLYGONACEAE: *Eriogonum* (Buckwheat). Associated with *E. umbellatum* (Sulphur Flower).

63. *Lycaena (Lycaena) xanthoides* (Bdv.)

THE GREAT COPPER flies in the foothills throughout the state and is distinguished by its large size and dull coloration.

Life Zones: Upper Sonoran (lower Transition). Plant Communities: Chaparral, Foothill Woodland, Yellow Pine Forest clearings. Meadow and open Streamside. Host Plants: POLYGONACEAE: *Rumex hymenosepalus* (Dock).

64. ***Lycaena* (*Lycaena*) *rubidus* (Behr)** **Pl. IV, fig. d**

THE RUDDY COPPER, earlier suspected of flying in the Yosemite region (Garth, 1935), occurs in the sagebrush region of the Gaylor Lakes Trail mentioned under the preceding *Lycaena* (*L.*) *heteronea,* and on the east Sierran slope as well.

Life Zones: Upper Sonoran to Hudsonian (Arctic-Alpine). Plant Communities: Sagebrush Scrub, openings in Subalpine Forest, and Alpine Fell-Fields. Host Plants:. POLYGONACEAE: *Rumex* (Dock), probably.

65. ***Lycaena* (*Lycaena*) *editha* (Mead)**

EDITH'S COPPER is a creature of the higher elevations of the eastern portion of the park, where it flies in company with *Lycaena mariposa, L. rubidus,* and *L. heteronea.* It resembles a compact model of *Lycaena xanthoides,* and might be called (with tongue in cheek), "The Small Great Copper."

Life Zones: Hudsonian, Arctic-Alpine. Plant Communities: Subalpine Forest openings, Subalpine Meadow, Alpine Fell-Fields. Host Plants: POLGONACEAE: *Rumex paucifolius* (Alpine Dock). ROSACEAE: *Potentilla tenuiloba, Horkelia fusca* (Cinquefoil).

66. ***Lycaena* (*Lycaena*) *mariposa* Reak.**

REAKIRT'S COPPER frequents small meadows of the southern exposure as far as timber line, but does not fly above. It was encountered by the senior author at 10,600 feet while crossing the Lyell Fork of the Tuolumne River preparatory to an ascent of Kuna Crest.

Life Zones: Hudsonian. Plant Communities: Openings in Subalpine Forest. Host Plants: POLYGONACEAE: *Polygonum Douglassii* (Buckwheat); can be raised on *Rumex* (Dock).

67. ***Lycaena* (*Lycaena*) *nivalis* (Bdv.)** **Pl. II, fig. f**

THE NIVALIS COPPER, known for many years only from a small colony at Glacier Point, flies generally throughout the park at elevations of 7,000 feet and above. It resembles The Purplish Copper, *Lycaena* (*L.*) *helloides,* but has an immaculate under side.

Life Zones: Canadian, Hudsonian. Plant Communities: Rocky Outcrops and Alpine Fell-Fields. Host Plant: Unknown. POLYGONACEAE: *Eriogonum* (Buckwheat) suspected.

68. ***Lycaena* (*Lycaena*) *helloides* (Bdv.)**

THE PURPLISH COPPER is believed to be primarily a dweller of the lowlands, but occasional specimens have been found at higher elevations. It lacks the luster of the preceding *Lycaena* (*L.*) *nivalis* and has a faintly dotted under side.

Life Zones: Upper Sonoran (Transition). Plant Communities: Forest openings. Moist situations, rocky outcrops. Host Plants: POLYGONACEAE: *Rumex acetosella* (Sheep Sorrel), *Polygonum aviculare* (Knotweed), *Oxytheca.* ONAGRACEAE: *Gayophytum.*

69. *Lycaena (Lycaena) phlaeas hypophlaeas* (Bdv.)
Pl. III, fig. h

The Sierran form of THE AMERICAN COPPER, first reported from the Yosemite region by Garth (1935b), has been established as the typical *Lycaena (L.) phlaeas hypophlaeas*. Although the glacial tarn on the north face of Mt. Maclure known locally as Bert Lake in honor of former park naturalist C. A. "Bert" Harwell was revisited by Oakley Shields, no additional specimens were found there. The north slope of Mt. Dana, however, yielded a limited number, found on a steep slope on which footing was precarious. Characterized by its small size, subdued brassy color, and bluish spots above the orange submarginal band of the secondaries, the Yosemite form appears closer to the Arctic race *feildeni* M'Lachlan than to the eastern race, to which the name *americana* Morris is now applied.

Life Zones: Arctic-Alpine. Plant Communities: Alpine Fell-Fields Host Plants: POLYGONACEAE: *Rumex* (Dock), especially *R. acetosella,* for the eastern subspecies.

70. *Lycaena (Lycaena) cupreus* (Edw.) **Pl. III, fig. j**

THE LUSTROUS COPPER is the most intense bit of color on the wing in Yosemite. Its fiery dress enlivens the mountain meadows. Only *Lycaena (L.) snowi* (Edw.) of the Rockies, considered by Klots (1936) and by Brown (1955) to be a subspecies of *cupreus,* rivals it in brilliance. It flies over *Spraguea umbellata* (=*Calyptridium umbellatum*) (Pink Pussy Paws) on rock slides not far from retreating snow.

Life Zones: Hudsonian, Arctic-Alpine. Plant Communities: Alpine Fell-Fields. Host Plants: Unknown.

71. *Lepotes marina* (Reak.)

THE MARINE BLUE, an Austral species, has been encountered by us only in the Mono Lake area.

Life Zones: Lower Sonoran, Upper Sonoran. Plant Communities: Several over its wide range. Host Plants: LEGUMINOSAE: *Medicago* (Alfalfa), *Astragalus* (Loco Weed, Rattle-Weed), *Lathyrus* (Sweet Pea).

72. *Brephidium exilis* (Bdv.)

THE PYGMY BLUE, until found at Mono Lake in the final year of this study, was recorded as present in the Yosemite region on the strength of a single female specimen obtained by Oakley Shields at Saddlebag Lake. It is the smallest of North American butterflies, with a wing expanse of .65 in.

Life Zones: Unrestricted. Plant Communities: Alkali Sink, Salt Marsh. Host Plants: CHENOPODIACEAE: *Atriplex* (Salt Bush), *Chenopodium* (Lamb's Quarters).

73. *Hemiargus (Echinargus) isolus* (Reak.) **Pl. IV, fig. e**

REAKIRT'S BLUE is an ubiquitous species, never common, but occurring over a wide territory and to a considerable elevation in the

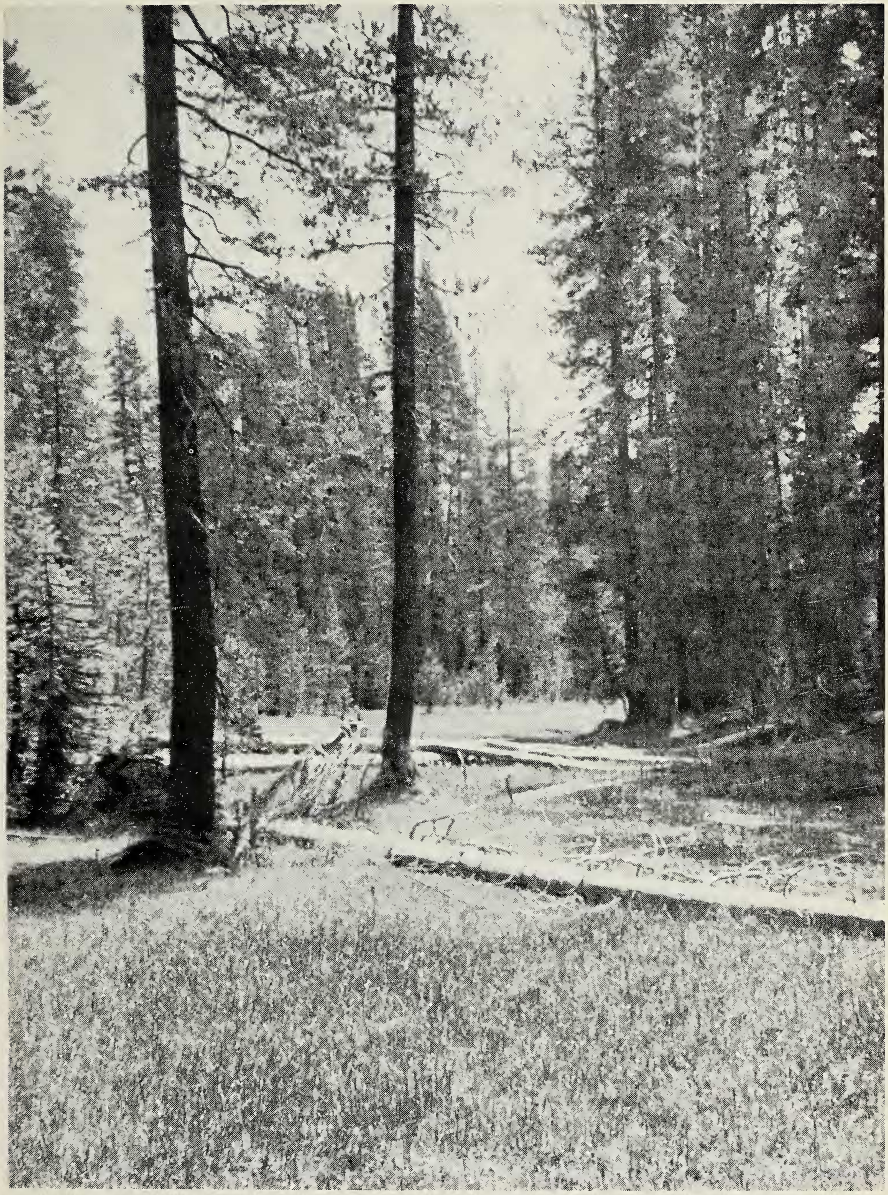


Fig. 6. Moist meadow surrounded by Lodgepole Pine and Red Fir forest. Canadian Zone. Research Reserve, el. 8,000 ft. *Anthocharis sara stella, Plejus saepiolus, Polygonia zephyrus, Precis orythya evarete,* and *Pyrgus ruralis* may be seen here.—Neva Snell.

drier eastern portions of the Sierra Nevada, at least in the 1958 season. A row of black dots encircled with white on the underside of the primaries is a distinguishing feature.

Life Zones: Unrestricted. Plant Communities: (Among others) Sagebrush Scrub. Host Plants: LEGUMINOSAE: *Astragalus* (Rattle Weed, Loco Weed), *Hosackia* (= *Lotus*), *Trifolium* (Clover).

74. *Lycaeides argyrognomon anna* (Edw.) **Pl. II, fig. i**

THE ANNA BLUE occurs at higher elevations in the western portion of the park, being found in the upper tier of timbered zones. It is always associated with lupine.

Life Zones: Canadian, Hudsonian. Plant Communities: Fir Forest openings. Host Plants: Undetermined. Probably LEGUMINOSAE: *Lupinus* (Lupine).

75. *Lycaeides melissa inyoensis* Nab. **Pl. IV, figs. i and l**

THE INYO BLUE is the name to be given to the race formerly recognized by most Californian lepidopterists as *lotis* (Lint.). According to Nabokov (1949), true *lotis* is a race of the foregoing *Lycaeides argyrognomon* restricted to peat bogs of Mendocino County. THE INYO BLUE flies in the eastern portion of the Yosemite region.

Life Zones: Unrestricted. Plant Communities: Several, including Freshwater Marsh, Alkali Sink, Meadowland, Marsh, Cultivated Field, Fence-Row, and Roadside Associations. Host Plants: LEGUMINOSAE: *Astragalus* (Loco Weed, Rattle Weed), *Hosackia* (= *Lotus*), *Lupinus* (Lupine), *Medicago* (Alfalfa), *Glycyrrhiza lepidota* (Liquorice), at Lone Pine.

76. *Plebejus* (*Agriades*) *glandon podarce* (F. & F.) **Pl. III, fig. g**

THE GRAY BLUE is perhaps the most characteristic butterfly of the Sierran sub-alpine meadow. It is common at Tioga Pass, where at times it fairly swarms, always in association with *Dodecatheon alpinum* (Shooting Star). As soon as the sun's rays leave the mountain valleys, it settles upon the grasses and sedges and may be picked by hand or by forceps. A cross on each fore-wing serves to distinguish the species.

Life Zones: Upper Canadian, Hudsonian (Arctic-Alpine). Plant Communities: Sub-alpine Meadow, Alpine Fell-Fields. Host Plants: Unknown. PRIMULACEAE: *Gregoria* for European *P. glandon,* to which *Primula* (Primrose) and *Dodecatheon* (Shooting Star) are related.

77. *Plebejus* (*Plebejus*) *saepiolus* (Bdv.)

THE GREENISH BLUE flies with the foregoing species, *Plebejus* (*A.*) *glandon podarce,* and in equal abundance. *P.* (*P.*) *saepiolus,* however, descends to lower elevations, as at Glacier Point and Aspen Valley. As with the former species, only the male wears the color indicated by the common name, the female being drab brown. The commonest blue in the park at higher elevations, and the one with the longest flight season, it has two broods, the first tending to oviposit on clover, the second on *Hosackia.*

Life Zones: Canadian, Hudsonian (Arctic-Alpine). Plant Communities: Subalpine Meadow, Alpine Fell-Fields. Host Plants: LEGUMINOSAE: *Trifolium* (Clover), *Hosackia* (= *Lotus*).

78a. *Plebejus (Icaricia) icarioides icarioides* (Bdv.)
b. *Plebejus (Icaricia) icarioides helios* (Edw.)

BOISDUVAL'S BLUE is a widely distributed species, having been subdivided into numerous geographical races. The Yosemite form is close to the nominate form; the name *helios* Edw. is here applied to specimens from Mono Lake. Because of its relatively large size and uniform markings, as well as its solid blue coloration, this species may be confused with *Lycaena (L.) heteronea* Bdv. when on the wing.

Life Zones: (Upper Sonoran), Transition, Canadian. Plant Communities: Coastal Sage Scrub, Chaparral, Foothill Woodland, Yellow Pine and Mixed Coniferous Forest openings for *P. i. icarioides;* Sagebrush Scrub, Pinon-Juniper Woodland, Juniper Woodland, Jeffrey Pine Forest openings for *P. i. helios*. Host Plants: LEGUMINOSAE: *Lupinus* (Lupine), perennial species only.

79. *Plebejus (Icaricia) shasta comstocki* (Fox) Pl. III, fig. e

THE YOSEMITE BLUE is the name given this insect in Comstock's "Butterflies of California," although by virtue of its Latin name it might be called Comstock's Blue instead. Its metropolis is above timber line, but isolated colonies occur above 7,000 feet, as at Glacier Point. It flies over dwarf lupine and yellow buckwheat, *Eriogonum incanum,* but has not been observed to oviposit on either. The long flight season suggests two broods. The Rocky Mountain *Plebejus (Icaricia) shasta minnehaha* (Scud.) flies only above tree line and often above 12,000 feet.

Life Zones: Hudsonian, Arctic-Alpine. Plant Communities: Subalpine Forest openings, Alpine Fell-Fields. Host Plants: Unknown. LEGUMINOSAE: *Lupinus* (Alpine Lupine) suspected.

80. *Plebejus (Icaricia) acmon* (West. & Hew.)

THE ACMON BLUE may be found throughout the Sierra Nevada at almost any elevation. It occasionally flies in company with the following *Plebejus (I.) lupini.* From this circumstance, plus a possible different host plant, it has been suggested that the two are distinct species, and they are tentatively so considered here.

Life Zones: Upper Sonoran, Transition, Canadian (Hudsonian. Plant Communities: Many. Host Plants: LEGUMINOSAE: *Astragalus* (Loco Weed, Rattle Weed), *Hosackia* (= *Lotus*), *Lupinus* (Lupine). POLYGONACEAE: *Eriogonum* (Buckwheat).

81. *Plebejus (Icaricia) lupini* (Bdv.)

THE LUPINE BLUE may be distinguished from *Plebejus (I.) acmon* by the purplish luster of both sexes. The two are sometimes found together, as at Smoky Jack Camp. Specimens from 11,000 feet are visibly smaller than those from moderate elevations; those from Lee Vining are visibly larger.

Life Zones: Canadian, Hudsonian, High Arid Transition. Plant Communities: Not determined. Subalpine Forest, Alpine Fell-Fields, Juniper Woodland, Sagebrush Scrub, among others. Host Plants: Apparently unknown, as distinct from *P.* (*I.*) *acmon. Eriogonum* (Buckwheat) association noted.

82. ***Everes comyntas*** **(Godt.)**

THE EASTERN TAILED BLUE is the species represented on the east side of the Sierra Nevada, although it is not known to which of several subspecies the Mono Lake population should be assigned.

Life Zones: Upper Sonoran (Hudsonian). Plant Communities: Not determined. Freshwater Marsh, Moist Meadow associations. Host Plants: LEGUMINOSAE: *Trifolium* (Clover), *Vicia* (Vetch), *Astragalus* (Loco Weed, Rattle Weed).

83. ***Everes amyntula*** **(Bdv.)**

THE WESTERN TAILED BLUE has been seen in Yosemite Park by one of us (Garth). It was flying over a tall, succulent lupine in the vicinity of a white fir grove at Hetch-Hetchy summit. It occurs in the foothills west of the park.

Life Zones: Transition (Canadian). Plant Communities: Yellow Pine Forest openings. Host Plants: LEGUMINOSAE: *Astragalus* (Loco Weed, Rattle Weed), *Lathyrus* (Sweet Pea), *Vicia* (Vetch).

84. ***Philotes enoptes*** **(Bdv.)**

THE DOTTED BLUE, as found at Glacier Point, is typical. Specimens found at Research Reserve show mixed characters, but are separable from the following species.

Life Zones: Transition, Canadian (Hudsonian). Plant Communities: Understory of several. Host Plants: POLYGONACEAE: *Eriogonum* (Buckwheat) of the *latifolium* group. The eggs are concealed in the flower head, on which the larvae feed.

85a. ***Philotes battoides battoides*** **(Behr)**
b. ***Philotes battoides glaucon*** **(Edw.)**

THE SQUARE-SPOTTED BLUE of Yosemite is an inhabitant of the Alpine Fell-Fields, appearing very early in the year for so high an altitude. It also flies atop Research Ridge (Boundary Hill), keeping well within the few acres marked by the presence of weak Hudsonian elements. It flies over *Eriogonum incanum,* a yellow buckwheat, and *Astragalus bolanderi,* a straggly legume. Specimens found within the park represent the typical form. Specimens found at Mono Lake are referred to THE GLAUCON BLUE, a subspecies.

Life Zones: Hudsonian for *P. b. battoides;* Upper Sonoran, Arid Transition for *P. b. glaucon.* Plant Communities: Rock Garden for *P. b. battoides;* Juniper Woodland, Sagebrush Scrub for *P. b. glaucon.* Host Plants: POLYGONACEAE: *Eriogonum* (Buckwheat).

86. ***Philotes speciosa*** **(Hy. Edw.)**

THE SMALL BLUE is typically a desert insect, found around dry lake beds (playas) in the Mojave Desert. Occasional specimens occur in the Central Valley region of California, and one of us (Garth) has found it at Hume Lake in Sequoia-Kings Canyon National Park. The

Mariposa and Briceburg specimens collected by G. and R. Bohart may represent an undescribed subspecies. Both specimens are larger, with wider margins in the male, and with the hind wings less spotted below, than normal specimens from the desert. In the absence of sufficient material, description must wait.

Life Zones: Lower Sonoran in the Mojave Desert; Upper Sonoran (Transition) in the western Sierra Nevada. Plant Communities: Not determined. Stream Bed Association. Host Plants: POLYGONACEAE: *Eriogonum* (Buckwheat) in San Diego County; *Oxytheca perfoliata* in the Mojave Desert; in the Sierra unknown.

87. *Phaedrotes piasus* (Bdv.)

THE ARROWHEAD BLUE, while not common in the Yosemite region, occurs in the western foothills, the middle elevations, and on the eastern slope at Mono Lake.

Life Zones: Upper Sonoran, Transition, Canadian. Plant Communities: Several. Host Plants: LEGUMINOSAE: *Lupinus* (Lupine).

88a. *Glaucopsyche lygdamus behrii* (Edw.)
b. *Glaucopsyche lygdamus columbia* (Skin.)

BEHR'S BLUE flies in the early spring in the western foothills. At higher elevations it is replaced by THE COLUMBIA BLUE, a montane subspecies found in cooler parts of most of the United States and Canada. It is not common in the Tioga Pass region, nor indeed anywhere, its colonies being widely scattered.

Life Zones: Upper Sonoran for *G. l. behrii;* Canadian, Hudsonian for *G. l. columbia.* Plant Communities: Foothill Woodland, Chaparral for *G. l. behrii;* Subalpine Forest, Alpine Fell-Fields for *G. l. columbia.* Host Plants: LEGUMINOSAE: *Lotus* (= *Hosackia*), *Astragalus* (Loco Weed, Rattle Weed), *Lathyrus* (Sweet Pea), *Lupinus* (Lupine), *Vicia* (Vetch).

89. *Celastrina argiolus echo* (Edw.)

THE ECHO BLUE is the western representative of a highly polymorphic species, now recognized as having Old World affinities. One of the earliest butterflies to emerge in the spring, it follows the season's advance to higher altitudes, occurring through three life zones. Male and female are strikingly dissimilar in pattern.

Life Zones: Upper Sonoran, Transition, Canadian. Plant Communities: Many. Host Plants: LEGUMINOSAE: *Hosackia* (= *Lotus*), *Lupinus* (Lupine); RHAMNACEAE: *Ceanothus* (Lilac), *Spiraea* (Spirea); SAPINDACEAE: *Aesculus* (Buckeye); ERICACEAE: *Arctostaphylos* (Manzanita); FAGACEAE: *Quercus* (Oak); CORNACEAE: *Cornus* (Dogwood). In many instances, only the flower buds are fed upon.

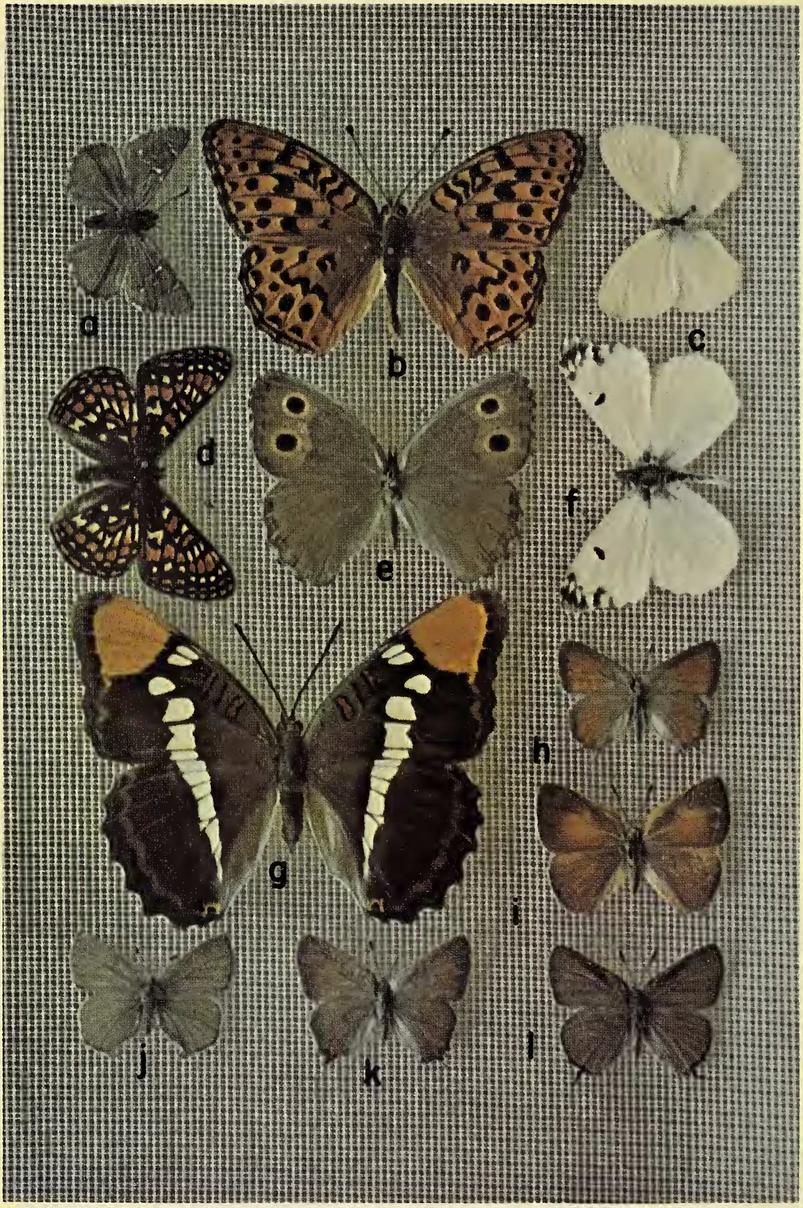


PLATE I

PLATE I

THE WESTERN FOOTHILLS

a. Thorbes diversus ♂
Aspen Valley, J.S.G.
b. Argynnis z. zerene ♂
Mather, J.S.G.
c. Coenonympha t. californica ♂
Jerseydale, J.S.G.
d. Euphydryas e. rubicunda ♂
Indian Flat, J.W.T.
e. Cercyonis sylvestris ♀
Hetch-Hetchy, J.S.G.
f. Anthocharis lanceolata ♂
Yosemite Valley, Paul Allen
g. Limenitis b. californica ♀
Hetch-Hetchy, J.S.G.
h. Habrodais grunus ♀
Hetch-Hetchy, J.S.G.
i. Callophrys nelsoni ♀
Hetch-Hetchy, J. S.G.
j. Callophrys d. windi ♀
Indian Flat, J.W. T.
k. Strymon auretorum ♀
Hetch-Hetchy, J S.G.
l. Callophrys johnsoni ♂
Jerseydale, A.O.S.

PLATE II

THE WESTERN MID-ELEVATIONS

a. Anthocharis s. stella ♀
White Wolf, J.S.G.
b. Limenitis lorquini ♂
Aspen Valley, J.S.G.
c. Phyciodes mylitta ♀
Yosemite Creek, J.S.G.
d. Boloria epithore ♀
Tioga Road, J.S.G.
e. Parnassius c. baldur ♂
White Wolf, J.S.G.
f. Lycaena nivalis ♀
Research Reserve, J.S.G.
g. Hesperia harpalus ♂
Yosemite Creek, J.S.G.
h. Argynnis a. irene ♂
Aspen Valley, J.S.G.
i. Lycaeides a. anna ♂
Aspen Valley, J.S.G.
j. Melitaea palla ♂
White Wolf, J.S.G.
k. Polygonia zephyrus ♀
Tuolumne Grove, J.S.G.
l. Melitaea hoffmanni ♀
White Wolf, J.S.G.

PLATE III

THE HIGH COUNTRY

a. Melitaea d. malcolmi ♂
Gaylor Lakes, J.S.G..
b. Oeneis c. ivallda ♂
Glacier Lodge, J.S.G.
c. Euphydryas e. nubigena ♀
Rafferty Creek, J.S.G.
d. Polites s. tecumseh ♂
Upper Gaylor Lake, J.S.G.
e. Plebejus s. comstocki ♂
Yosemite Park, J.S.G.
f. Parnassius p. behri ♂
Gayl Lakes, J.S.G.
g. Plebejus g. podarce ♂
Research Reserve, J.S.G.
h. Lycaena p. hypophlaeas ♀
N. slope, Mt. Dana, A.O.S.
i. Colias behri ♂
Tioga Pass, J.S.G.
j. Lycaena cupreus ♂
Lembert Dome, J.S.G.
k. Callophrys lemberti (paratype) ♂
Tioga Pass, J.W.T.
l. Argynnis m. arge ♀
Tioga Pass, J.S.G.
m. Hesperia miriamae ♀
Unicorn Peak, A.O.S.

PLATE IV

THE MONO BASIN

a. Coenonympha t. mono ♂
W of LeeVining, A.O.S.
b. Argynnis c. nevadensis ♂
near Mammoth, J.S.G.
c. Cercyonis oeta ♂
June Lake, J.S.G.
d. Lycaena rubidus ♂
Virginia Lakes, J.S.G.
e. Hemiargus isolus ♀
Rafferty Cr., J.S.G.
f. Euphydryas e. monoensis ♂
Mono Lake, A.O.S.
g. Strymon behrii ♀
Mammoth, J.S.G.
h. Limenitis w. nevadae ♂
Mono Lake, J.S.G.
i. Lycaeides m. inyoensis ♂
Mono Lake, J.W.T.
j. Strymon f. semiluna ♂
Mono Lake, A.O.S.
k. Argynnis n. apacheana ♂
Round Valley, J.S.G.
l. Lycaeides m. inyoensis ♀
Lone Pine, J.W.T.

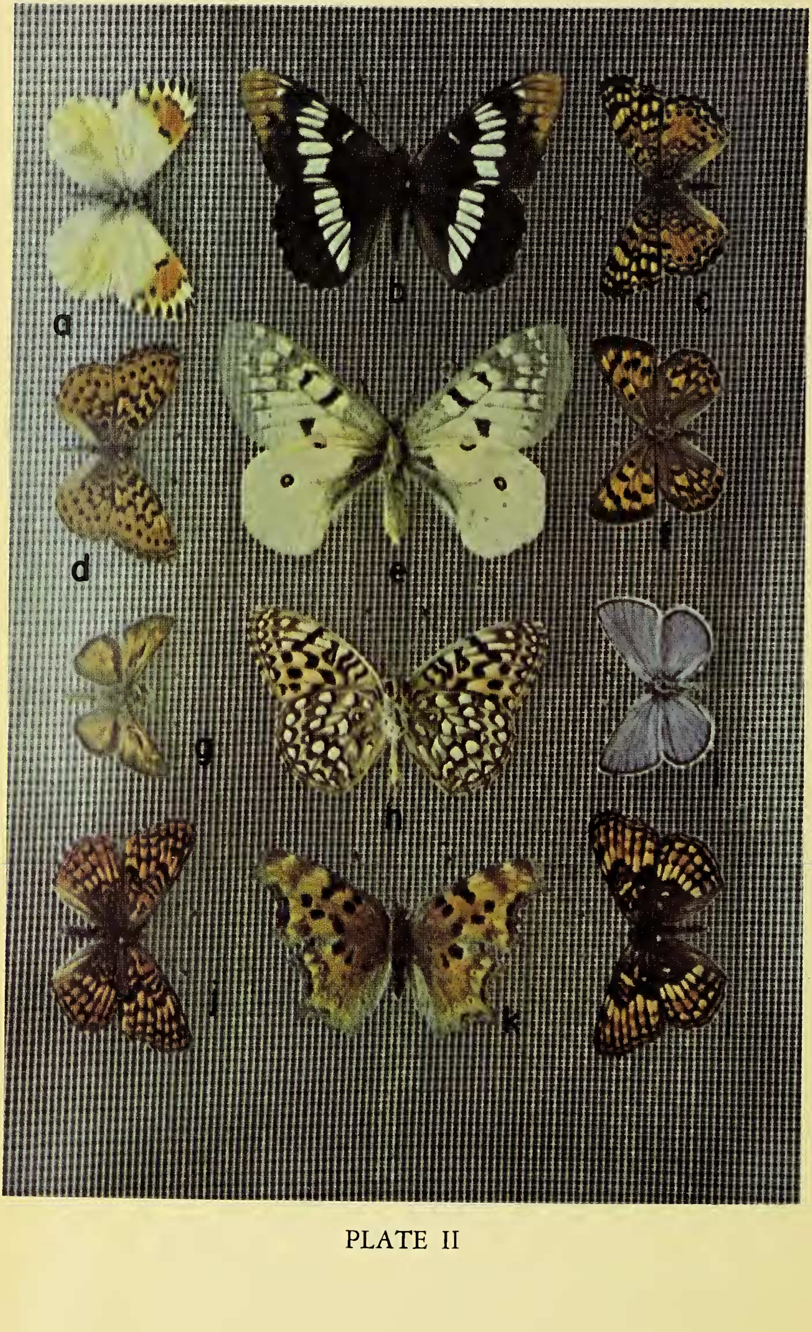


PLATE II

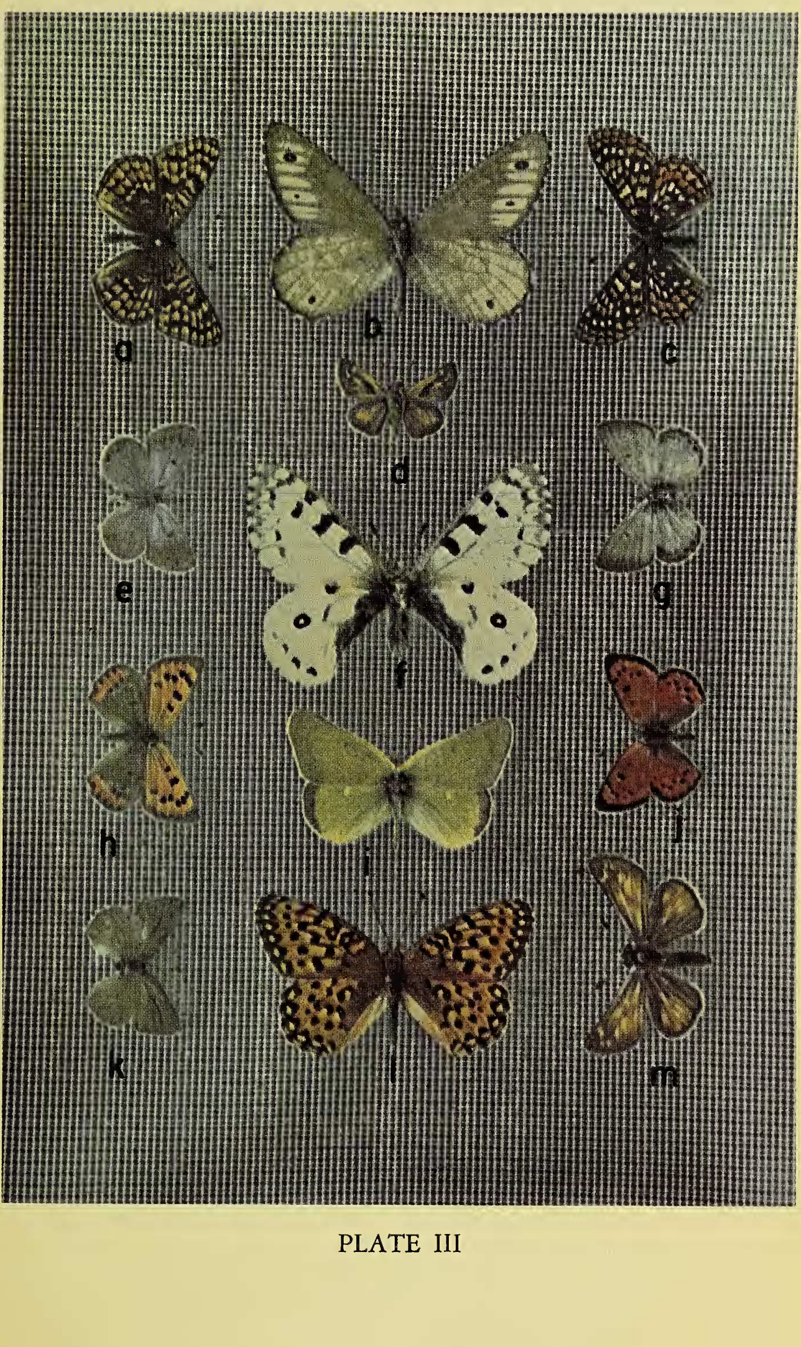


PLATE III

PIERIDAE

90a. *Anthocharis* (*Anthocharis*) *sara sara* Lucas
Anthocharis (*Anthocharis*) *sara reakirtii* Edw., *gen. vern.*
b. *Anthocharis* (*Anthocharis*) *sara stella* Edw. Pl. II, fig. a

THE SARA ORANGE-TIP and its overwintering form, REAKIRT'S ORANGE-TIP, occur in the western lowlands at Briceburg and El Portal. THE STELLAR ORANGE-TIP is the high-altitude race found in California, race *julia* Edw. being from Colorado and race *flora* Wgt. from Oregon and north. Females of this form are yellowed, unlike those of the lowland forms, in which females are white like the males.

Life Zones: Upper Sonoran, lower Transition for *A. sara sara;* upper Transition, Canadian for *A. s. stella.* Plant Communities: Valley Grasslands, Foothill Woodland, Chaparral, Yellow Pine Forest for *A. s. sara;* White Fir Forest, Red Fir Forest for *A. s. stella.* Forest openings and Riparian Association. Host Plants: CRUCIFERAE: *Arabis* (Rock Cress), *Brassica* (Mustard), *Sisymbrium* (Hedge Mustard).

91. *Anthocharis* (*Falcapica*) *lanceolata* Lucas Pl. I, fig. f

THE LANCEOLATE MARBLE (formerly called Boisduval's Marble when authorship was attributed to him) is an early flier, to be sought from mid-May to mid-June. It seeks the vertical walls of Yosemite Valley and may be seen on the precipitous talus slopes near Bridal Veil Falls. Yosemite specimens are almost gray enough beneath to match race *australis* (Grin.) from southern California.

Life Zones: Upper Sonoran, Transition. Plant Communities: Chaparral, Foothill Woodland, Mixed Evergreen Forest. Rocky Outcrop and Cliffside Associations. Host Plants: CRUCIFERAE, especially *Arabis perfoliata* (Rock Cress).

92. *Euchloe creusa hyantis* (Edw.)

EDWARDS' MARBLE may be separated from the following Colorado Marble by the heavy green marbling of the under side of the secondaries against a background of dead white, *Euchloe ausonides coloradensis* having less green and of a decidedly yellowish cast against a pearly white ground color. The green of both species is an effect produced by yellow scales laid over black, as examination with a hand lens will demonstrate. The black bar at the end of the cell is wide in *creusa.*

Life Zones: Upper Sonoran, Transition, Canadian. Plant Communities: Chaparral, Foothill Woodland, Mixed Evergreen Forest, White Fir Forest. Host Plants: CRUCIFERAE: *Arabis* (Rock Cress), *Streptanthus* (Jewel Flower).

93. *Euchloe ausonides coloradensis* (Hy. Edw.)

THE COLORADO MARBLE is the common *Euchloe* of the Research Reserve, where approximately four specimens were found for every one of *E. creusa hyantis.* Both fly to the mountain tops and may be seen in good numbers by the observer who stations himself in such

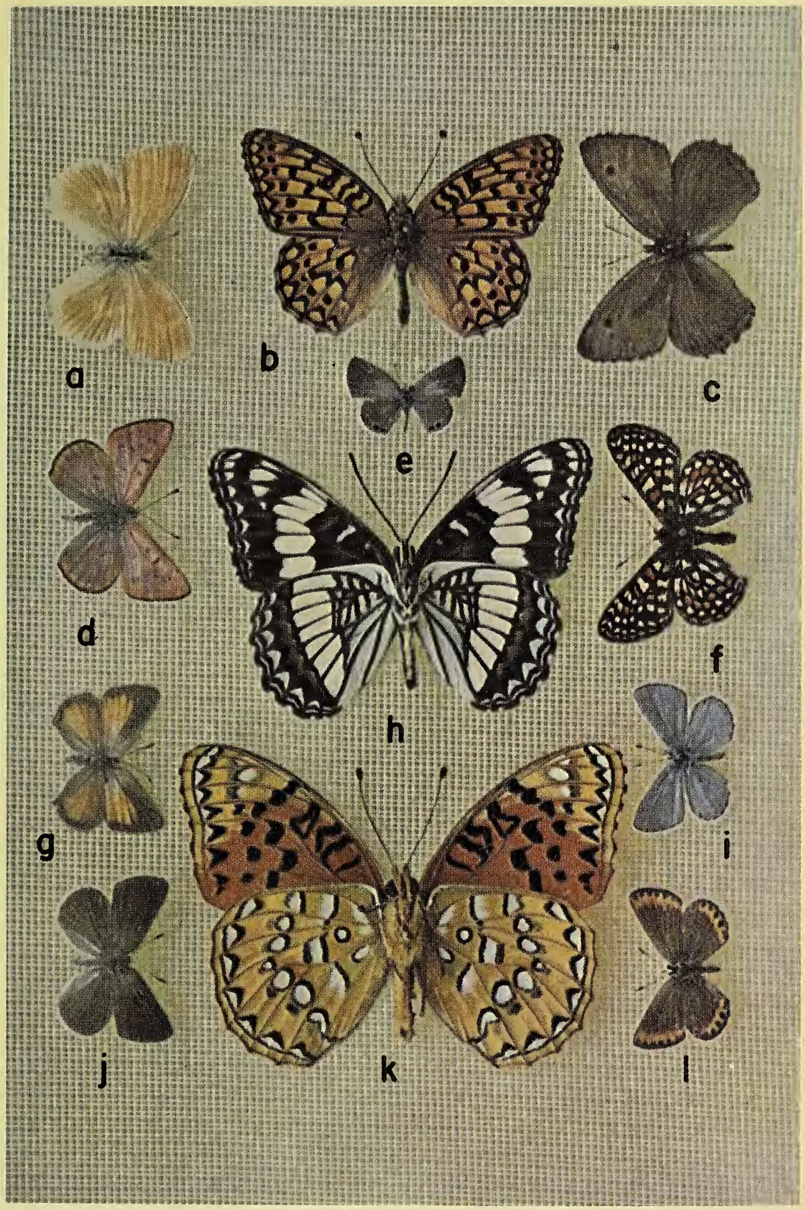


PLATE IV

a situation. Like Behr's Parnassian, *Parnassius phoebus behrii* Edw., it belongs to the Great Basin fauna. The black bar at the end of the cell is narrow.

Life Zones: Canadian, Hudsonian. Plant Communities: Coniferous Forest openings. Host Plants: CRUCIFERAE: *Arabis* (Rock Cress), *Erysimum* (Wall Flower), *Sisymbrium* (Hedge Mustard).

94. *Colias eurytheme* Bdv.

THE CLOUDED SULPHUR is partial to grassy meadows and to cultivated areas, where it substitutes introduced alfalfa for indigenous *Astragalus* for its food plant. The summer form, *amphidusa* Bdv., is larger and more orange. Both have two forms of the female, normal and albinic, but only one form of the male.

Life Zones: Unrestricted. Plant Communities: Immaterial, if legumes be present. Host Plants: LEGUMINOSAE: *Astragalus* (Loco Weed, Rattle Weed), *Hosackia* (= *Lotus*), *Medicago* (Alfalfa), *Melilotus* (Sweet Clover), *Trifolium* (Clover), *Vicia* (Vetch).

95. *Colias philodice hagenii* Edw.

HAGEN'S SULPHUR is a Great Basin race of a widely ranging North American species found otherwise mostly east of the Rocky Mountains. According to Hovanitz (1943, 1950), it does not occur west of the Sierra-Cascade Divide Triple-brooded at Mono Lake, it may be recognized by its yellow, rather than orange, coloration.

Life Zones: Upper Sonoran, Transition. Plant Communities: Moist Meadows. Host Plants: LEGUMINOSAE: *Trifolium* (Clover).

96. *Colias occidentalis chrysomelas* Hy. Edw.

THE GOLDEN SULPHUR is the largest member of its genus occurring in California. An early flier, it is considered a rarity, having been seen by but one of us (Tilden) in the vicinity of Mather on June 30, 1962, in the course of this survey.

Life Zones: Transition. Plant Communities: Associated with coniferous forest at moderate elevations. Host Plants: LEGUMINOSAE: (Legumes).

97. *Colias behrii Edw.* **Pl. III, fig. i**

BEHR'S SULPHUR is the only greenish sulphur butterfly of the Sierra Nevada. Until the opening of the Tioga Road in 1915 it was considered a great rarity because of the extreme inaccessibility of its habitat, the Tuolumne Meadows. John Batiste Lembert, who homesteaded the Soda Springs quarter section in 1885, found that there was a demand for these butterflies and for a dozen years supplied them in quantity to universities and museums. The secret of their haunts he shared with the Indians, who in turn refused to divulge it to outsiders.

We now know that *Colias behrii* has as its metropolis the Tuolumne Meadows, that smaller colonies are present in adjacent subalpine meadows, and that it has been found to the south at Rock Creek and Mineral King. Its occurrence is tied closely to the distribution of Dwarf Bilberry, on which the larvae exclusively feed. Form ♀ *canescens*

PLATE V

a. Erynnis pacuvius lilias ♂
Chowchilla Mtn. J. W. T.
b. Argynnis zerene malcolmi ♂
Mammoth Lakes, J. W. Friday
c. Lycaena gorgon ♀
Lebec, J. S. G.
d. Everes amyntula ♂
Yucaipa, J. S. G.
e. Papilio indra ♂
Tioga Pass, A. O. S.
f. Callophrys iroides ♂
Grant Nat'l Park J. S. G.
g. Strymon saepium ♀
Hetch-Hetchy, J. S. G.
h. Lycaena editha ♀
Tioga Pass, J. S. G.
i. Philotes battoides glaucon ♂
Mono Lake. A. O. S.
j. Brephidium exilis ♂
Long Beach, J. S. G.
k. Philotes battoides battoides ♂
Research Reserve, J. S. G.
l. Pieris occidentalis calyce ♀
W of Tioga Pass, A. O. S.
m. Danaus plexippus ♂
Mather, J. S. G.
n. Euchloe creusa lotta ♀
Darwin, R. P. Allen
o. Polites sonora ♀
Aspen Valley, J. S. G.
p. Vanessa carye ♂
Topanga Canyon, J. S. G.
q. Vanessa cardui ♀
Grant Nat'l Park, J. S. G.
r. Polites sonora ♂
Bridal Veil Creek, J. S. G.
s. Lycaena heteronea ♀
Gem Lake, J. S. G.
t. Callophrys iroides ♂
Mammoth Lakes, J. S. G.
u. Phaedrotes piasus ♂
Tujunga, J. S. G.
v. Plebejus icarioides helios ♀
Warren Creek, J. S. G.

PLATE VI

a. Thorbes pylades ♂
Jersydale, J. W. T.
b. Pyrgus ruralis ♂
Boulder Creek, J. W. T.
c. Ochlodes agricola ♂
Hetch-Hetchy, J. S. G.
d. Amblyscirtes vialis ♂
Flagstaff, Ariz., K. Roever
e. Argynnis atlantis irene ♂
Aspen Valley, J. S. G.
f. Leptotes marina ♀
Long Beach, J. S. G.
g. Vanessa virginiensis ♀
Santa Cruz Mtns., J. S. G.
h. Strymon melinus pudica ♂
Long Beach, J. S. G.
i. Nymphalis milberti ♀
Yucaipa, J. S. G.
j. Lycaena arota virginiensis ♀
Mono Lake, A. O. S.
k. Pieris napi venosa ♂
Briceburg, K. T.
l. Papilio eurymedon ♂
Idyllwild, J. S. G.
m. Plebejus saepiolus ♂
Research Reserve, J. S. G.
n. Colias eurytheme ♂
Mather, J. S. G.
o. Argynnis cybele leto ♀
Strawberry, J. S. G.
p. Argynnis callippe inornata ♀
Jerseydale, A. O. S.

PLATE V

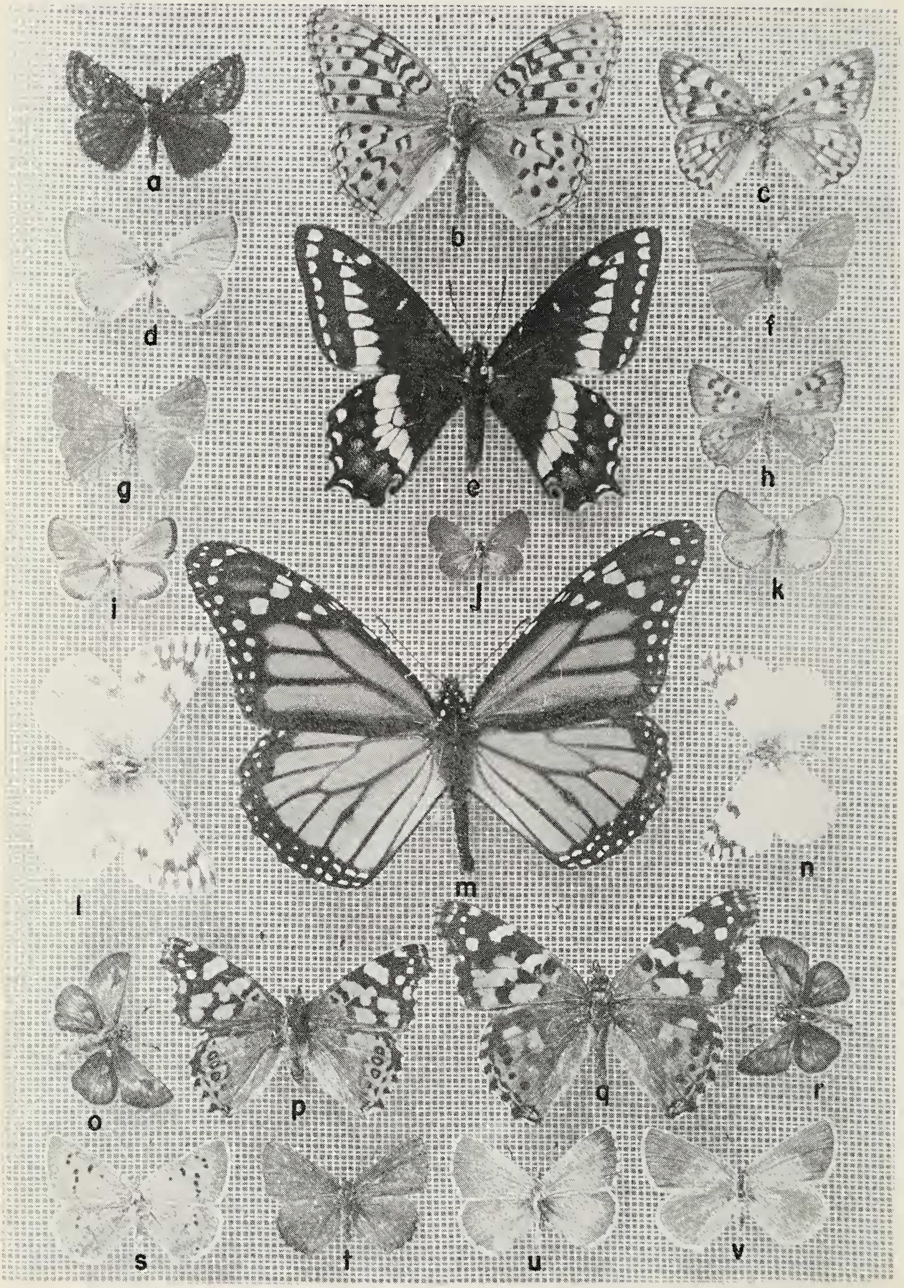
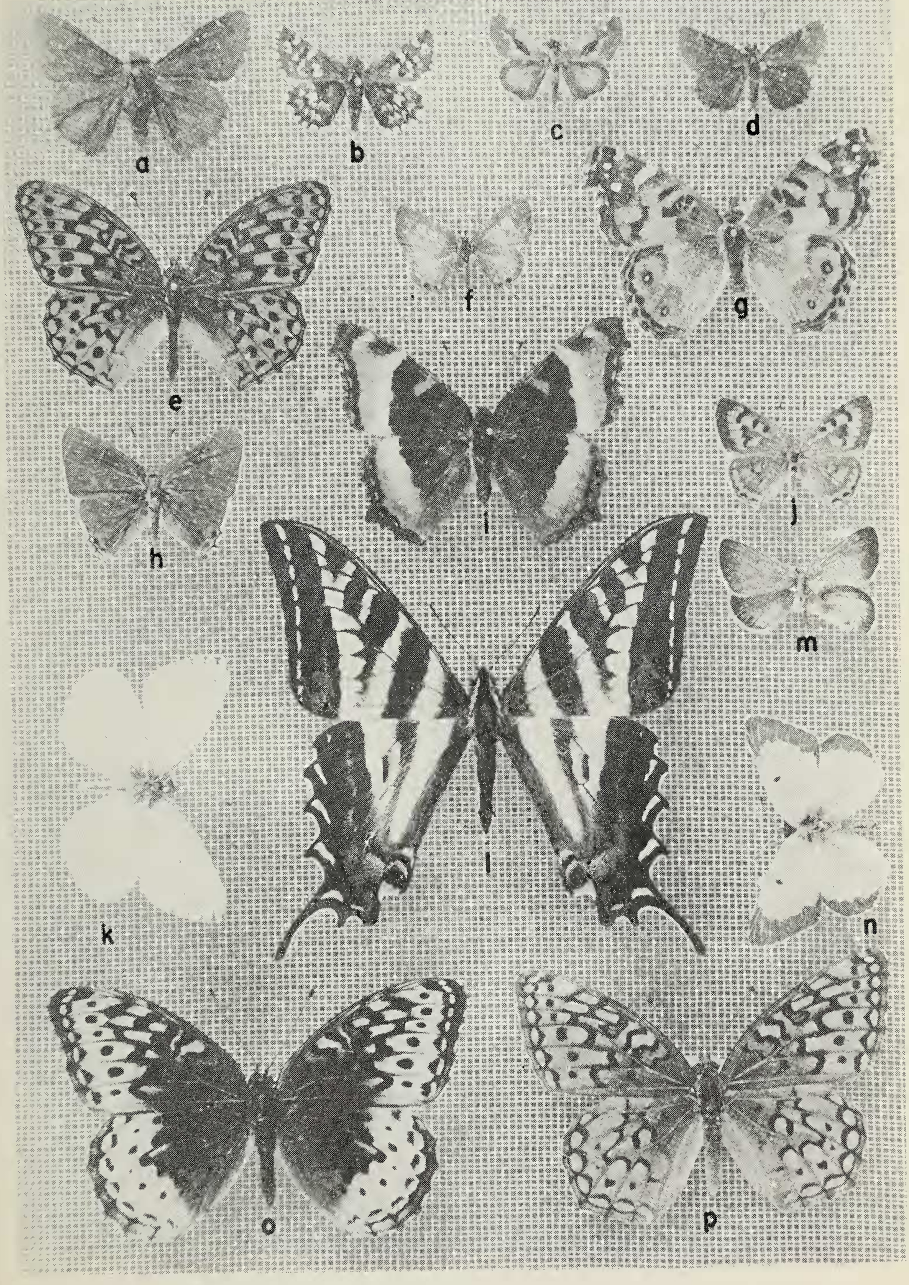


PLATE VI



Comst., although relegated to synonymy by McDunnough (1938), we find to be a valid albinic form that may be recognized on the wing.

Life Zones: Hudsonian (Arctic-Alpine). Plant Communities: Subalpine Meadows; basin areas of Subalpine Forest; moister parts of Alpine Fell-Fields. Host Plants: ERICACEAE: *Vaccinium caespitosum* (Dwarf Bilberry).

98. *Colias* (*Zerene*) *eurydice* Bdv.

THE CALIFORNIA DOG-FACE or FLYING PANSY, as it is sometimes called, must be a vagrant in the Yosemite region, for Hall (1912) does not record its food plant, False Indigo or Lead Bush, as occurring in the park. It is abundant in the foothills of southern California, and has been selected as the State butterfly. The male bears the figure of a dog's head on the forewing; the female is pure sulphur yellow.

Life Zones: Upper Sonoran, lower Transition. Plant Communities: Not determined for the Yosemite region. Host Plants: LEGUMINOSAE: *Amorpha californica* (False Indigo).

99. *Nathalis iole* Bdv.

THE DAINTY YELLOW is likely to be encountered in the least expected places, from sea level to 9,000 feet, and from early spring to early winter. There are no set rules of behavior for this diminutive sulphur, which has followed the Filaree into many an improbable situation.

Life Zones: Unrestricted. Plant Communities: Ubiquitous. Host Plants: GERANIACEAE: *Erodium* (Filaree). COMPOSITAE: *Helenium* (Sneezeweed), *Dyssodia* (None). CARYOPHYLLACEAE: *Stellaria* (Chickweed).

100. *Neophasia menapia tau* (Scud.)

THE PINE WHITE reaches the peak of its flight in August. The adults are high fliers, seldom descending from the tree tops. Although not abundant in 1933, they were seen by the hundreds in 1928 along the Big Oak Flat road by one of us (Garth). The larvae are of special interest to forest entomologists, having been known to defoliate pine trees over large areas. Resurrected from synonymy, the name *tau* is now applied to the western form.

Life Zones: Transition, Canadian. Plant Communities: Yellow Pine Forest, Jeffrey Pine Forest (east slope); occasionally Lodgepole Pine Forest. Host Plants: PINACEAE: *Pinus ponderosa* (Yellow Pine), *P. contorta Murrayana* (Lodgepole Pine); also, according to the observation of one of us (Tilden), *Pseudotsuga taxifolia* (Douglas

101. *Pieris* (*Pontia*) *beckerii* Edw.

BECKER'S WHITE prefers an arid environment and is encountered east of the Sierra Nevada from the Mojave Desert north through Owens Valley to Mono Lake. The green-margined veins of the under side suggest one of the Marbles, and where it flies with *Anthocharis*

PLATE VII

a. Epargyreus clarus ♀
Lagunitas, E.C. VanDyke
b. Hesperia juba ♂
Mather, J.W.T.
c. Ochlodes sylvanoides ♂
Virginia Lakes, J.S.G.
d. Erynnis propertius ♂
Yosemite Creek, J.S.G.
e. Glaucopsyche lygdamus columbia ♂
White Wolf, J.S.G.
f. Cercyonis pegala ariane ♀
Round Valley, J.S.G.
g. Argynnis egleis ♂
Yosemite Creek, J.S.G.
h. Plebejus i. icarioides ♀
Aspen Valley, J.S.G.
i. Euchloe creusa lotta ♀
Mono Lake, A.O.S.
j. Philotes speciosa ♂
Mojave Desert, J.S.G.
k. Heliopetes ericetorum ♂
Switzer-land, J.S.G.
l. Apodemia m. mormo ♂
Mono Lake, A.O.S.
m. Papilio rutulus ♂
Idyllwild, J.S.G.
n. Precis orithya evarete ♂
Grant Nat'l Park, J.S.G.
o. Plebejus lupini ♂
W. of Tioga Pass, A.O.S.
p. Nymphalis californica ♀
Idyllwild, J.S.G.
q. Colias eurytheme form alba ♀
Big Bear Lake, J.S.G.
r. Lycaenopsis argiolus echo ♀
Yucaipa, J.S.G.
s. Lycaena a. arota ♀
Gold Creek, J.W.T.
t. Lycaena xanthoides ♀
Mather, J.S.G.
u. Callophrys spinetorum ♂
Idyllwild, J.S.G.
v. Strymon adenostematis ♀
Hetch-Hetchy, J.S.G.

PLATE VIII

a. Erynnis tristis ♂
Redwood City, J.. W.T.
b. Thorbes mexicana nevada ♂
Tioga Pass, A.O.S.
c. Pyrgus communis ♂
Los Angeles, J.S.G.
d. Nathalis iole ♂
Warren Creek, A.O.S.
e. Pieris sisymbrii ♂
Research Reserve, J.S.G.
f. Ochlodes agricola ♂
El Portal
g. Strymon dryope ♂
Mono Lake. A.O.S.
h. Papilio zelicaon ♀
Mather, J.S.G.
i. Strymon californica ♂
Hetch-Hetchy
j. Lycaena helloides ♂
Mather, J.S.G.
k. Lycaena nivalis ♀
Glacier Point, J.D. Gunder
l. Melitaea leanira ♂
m. Colias (Zerene) eurydice ♂
Santa Ana R., J.S.G.
n. Phyciodes c. campestris ♂
Mather , J.S.G.
o. Argynnis mormonia arge ♂
Hetch-Hetchy, J.S.G.
p. Plebejus acmon ♂
Hetch-Hetchy
q. Philotes enoptes ♀
Research Reserve, J.S.G.
r. Polygonia satyrus ♂
Mono Lake, A.O.S.

PLATE VII

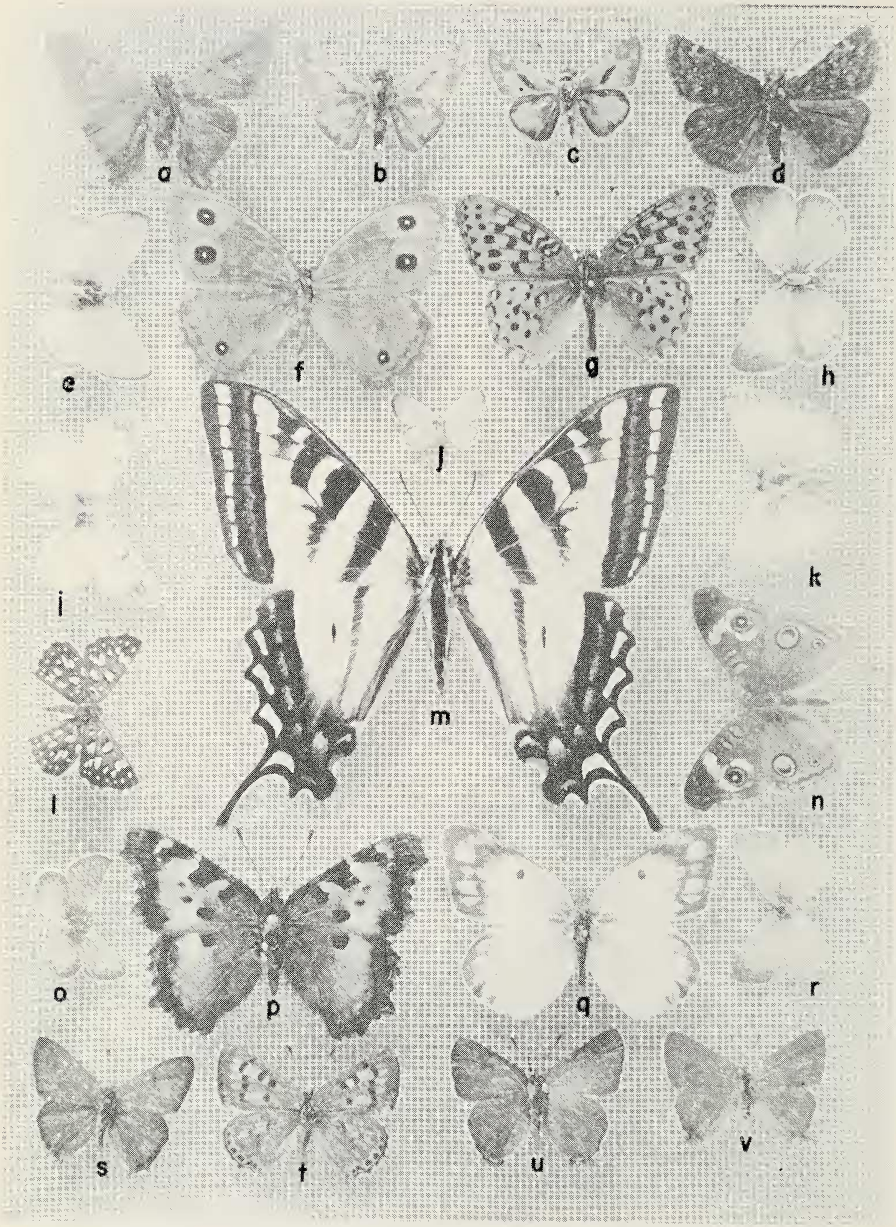
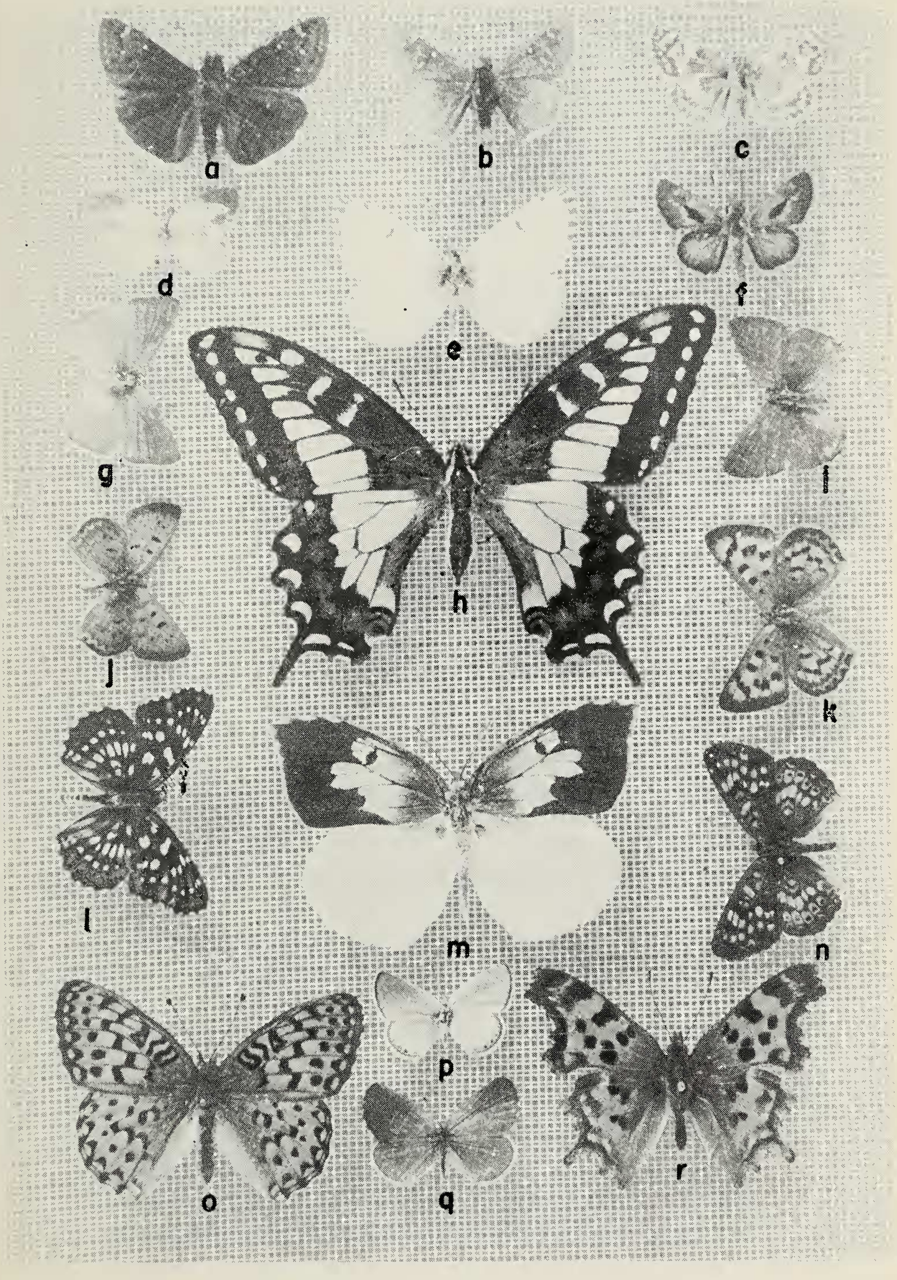


PLATE VIII



lanceolata australis Grin. in some of the desert canyons the two are not always distinguishable when on the wing.

Life Zones: Upper Sonoran, Transition. Plant Communities: Sagebrush Scrub, Shadscale Scrub, Piñon-Juniper and Juniper Woodland. Host Plants: CAPPARIDACEAE: *Isomeris arborea* (Bladder Pod). CRUCIFERAE: *Brassica nigra* (Mustard), *Sisymbrium altissimum* (Hedge Mustard), *Stanleya pinnata* (Desert Plume, Prince's Plume).

102. ***Pieris (Pontia) sisymbrii*** Bdv.

THE CALIFORNIA WHITE is an early flier in the western foothills, where it may be found at Briceburg and El Portal in mid-March. At higher elevations it flies in mid-summer with the following *Pieris (Pontia) occidentalis calyce,* these two being the only whites then on the wing. While *Sisymbrium,* from which it takes its scientific name, grows abundantly in the meadows of Research Reserve, the species exhibits a marked preference for *Caulanthus* and *Streptanthus* when these are available, according to Hovanitz (personal communication).

Life Zones: Unlimited. Plant Communities: The entire gamut from west to east. Host Plants: CRUCIFERAE: *Arabis* (Rock Cress), *Caulanthus* (Rock Cabbage), *Sisymbrium* (Hedge Mustard), *Streptanthus* (Jewel Flower).

103. ***Pieris (Pontia) protodice*** Bdv. & Lec.

THE COMMON WHITE appears limited to the lower tier of life zones in Yosemite. Those seen above Transition Zone are believed to have wandered upward because of their worn condition.

Life Zones: Upper Sonoran, Transition (Canadian). Plant Communities: Many. Host Plants: CAPPARIDACEAE: *Cleome lutea* (Bee Plant). CRUCIFERAE: *Brassica nigra* (Mustrad), *Raphanus* (Radish), *Lepidium densiflorum* (Pepper Grass), *Sisymbrium altissimum* (Hedge Mustard), the first and two last at Mono Lake on the authority of W. Hovanitz.

104a. ***Pieris (Pontia) occidentalis occidentalis*** Reak.

b. ***Pieris (Pontia) occidentalis calyce*** Edw.

THE WESTERN WHITE occurs throughout the park, its altitudinal form, EDWARD'S WHITE; at higher elevations only, although a small, dark form resembling *P. o. calyce* may be found in early spring in the western foothills. What one finds in the high country in August is *calyce,* freshly emerged (It is the only brood at higher elevations), plus worn second-brood *P. o. occidentalis* that have invaded from lower levels. L. G. Higgins of England recently (1953) associated *calyce* Edw. with the European *callidice* Esper as subspecies of *P. (Pontia) occidenalis,* which has been shown by Hovanitz (1963) to be specifically distinct from the preceding *P. (Pontia) protodice.*

Life Zones: Unrestricted for *P. o. occidentalis;* Canadian, Hudsonian for *P. o. calyce.* Plant Communities: Many for *P. o. occidentalis;* Alpine

Fell-Fields for *P. o. calyce*. Host Plants: CRUCIFERAE: *Arabis* (Rock Cress), *Lepidium densiflorum* (Pepper Grass), *Sisymbrium altissimum* (Hedge Mustard), the last two in the Mono Lake area, according to Hovanitz (personal communication).

105. ***Pieris* (*Pieris*) *napi venosa*** Scud.

THE VEINED WHITE is found in the foothills adjacent to Yosemite National Park on the San Joaquin Valley side from mid-March to mid-May, when it appears on the floor of Yosemite Valley. More lightly marked than typical *venosa,* this foothill population is not referable to any other named subspecies.

Life Zones: Upper Sonoran, Transition. Plant Communities: Foothill Woodland, Chaparral, Mixed Coniferous Forest. Riparian and Cool Woodland associations. Host Plants: CRUCIFERAE: *Barbarea* (Winter Cress), *Brassica* (Mustard), *Dentaria* (Milk Maids), *Raphanus* (Radish).

106. ***Pieris* (*Pieris*) *rapae*** **(Linn.)**

THE CABBAGE WHITE was introduced from Europe into Quebec, Canada, in 1858, reaching California about 1883. It now occupies not only cultivated areas, but has expanded into wild lands as well.

Life Zones: Unrestricted. Plant Communities: Many, as would be expected of a highly adaptable immigrant. Host Plants: CRUCIFERAE: *Brassica* (Mustard), *Radicula* (Yellow Cress), the latter around Cathay.

PAPILIONIDAE

107. ***Papilio zelicaon*** Luc.

THE ANISE SWALLOWTAIL is a "hill-topper" species, choosing the most exposed situations for its flight. Usually only the males disport themselves in this way, six being found at the very summit of Research Ridge. It is partial to the blossoms of the Western Wallflower, *Erysimum asperum.* Although readily confused with *Papilio bairdii brucei* Edw., which occurs in the region of the Mono Craters east of the Sierra Nevada, *P. zelicaon* has less yellow on the abdomen than does *P. brucei.*

Life Zones: Unrestricted. Plant Communities: Chaparral, Foothill Woodland, openings in Coniferous Forest. Host Plants: UMBELLIFERAE: *Daucus* (Wild Carrot), *Foeniculum vulgare* (Fennel, Anise), *Heracleum lanatum* (Cow Parsnip).

108. ***Papilio indra*** Reak.

THE INDRA SWALLOWTAIL has been seen also at the summit of Research Ridge. An erratic flier, it has proven most elusive, and Yosemite records are few. These include the floor of Yosemite Valley, the summit of Yosemite Falls, northwest above Tioga Pass, and Mono Lake. On the west bank of Yosemite Creek it flies with *Parnassius phoebus behrii* Edw. on dry slopes in association with Juniper, *Sedum,* and *Sanicula.*

Life Zones: Transition, Canadian, Hudsonian. Plant Communities: Juniper Woodland. Host Plants: UMBELLIFERAE: *Pteryxia* (= *Cymopterus*) *terebrinthina* in the Sierra Nevada (Emmel and Emmel, 1963).

109. *Papilio rutulus* Luc.

THE WESTERN TIGER SWALLOWTAIL is a species that transcends zonal limits in its adherence to the stream-bank association. It occurs at El Portal on the Merced River, thence through the Yosemite Valley and its tributary streams well into Canadian Zone. One of us (Tilden) has even observed it in Subalpine Forest at Tioga Pass.

Life Zones: Unrestricted. Plant Communities: Willow, Cottonwood, and Aspen groves, Riparian Association. Host Plants: SALICACEAE: *Populus* (Cottonwood), *Salix* (Willow). BETULACEAE: *Alnus* (Alder). ROSACEAE: *Prunus* (Choke-Cherry).

110. *Papilio multicaudatus* Kby.
Syn. *Papilio daunus* Bdv.

THE TWO-TAILED SWALLOWTAIL has been known to inhabit the Yosemite region since 1930, when B. A. Thaxter and Edna Banta, Yosemite Field School members, wrote: "Among the swallowtails found here we took *Papilio daunus,* the largest western species, a bright yellow butterfly with black markings and two tails on each hind wing." Their brief report, "Some Butterflies and Moths of the Yosemite Valley Region," is on file at the Yosemite Museum, but their two specimens are without accompanying data. For information on exact locality and date we are indebted to Oakley Shields, who twice encountered it in August at Jerseydale, where it came to thistles.

Life Zones: Upper Sonoran, Transition. Plant Communities: All at moderate elevations. Host Plants: SALICACEAE: *Populus* (Cottonwood), *Salix* (Willow). LAURACEAE: *Umbellularia* (Laurel). OLEACEAE: *Fraxinus* (Ash). ROSACEAE: *Amelanchier* (Service Berry), *Prunus* (= *Cerasus*) (Choke-Cherry). RUTACEAE: *Ptelea* (Hop Tree).

111a. *Papilio eurymedon eurymedon* Luc.
b. *Papilio eurymedon albanus* F. & F.

THE PALE SWALLOWTAIL is more frequently encountered on dry hillsides than is the nearly related and equally abundant *Papilio rutulus*. While the food plant adheres strictly to the lower zones, the strong wings of the butterfly carry it to the tops of the highest peaks. A form or possible subspecies occurring at the higher altitudes, smaller in size and darker in color, is known as *P. e. albanus* F. & F.

Life Zones: Upper Sonoran, Transition, straying higher. Plant Communities: Chaparral, Foothill Woodland, and the chaparral-like under story of most Coniferous Forests. Host Plants: RHAMNACEAE: *Rhamnus* (= *Frangula*) *californicus* (Coffee Berry), *R. crocea* (Red Berry), *Ceanothus* (Snow Bush).

112. *Parnassius clodius baldur* Edw. **Pl. II, fig. e**

THE BALDUR PARNASSIAN flies to the very rim of the precipitous walls of Yosemite Valley, but does not descend into the valley itself. In the Research Reserve it was particularly abundant, flying over thickets of *Castanea* (Chinquapin) and *Holodiscus* (Ocean Spray), and pausing occasionally to sip nectar from yellow *Senecio*, a composite. While the fir belt generally defines its habitat, it occasionally strays higher among Lodgepole Pine and Mountain Hemlock. A few individuals are without the black-margined secondaries and suggest the parent species, *P. clodius* Mén.

Life Zones: (upper Transition), Canadian, lower Hudsonian (Arctic-Alpine). Plant Communities: Red Fir Forest; Lodgepole Pine Forest; exceptionally, Alpine Fell- Fields. Host Plants: CRASSULACEAE: *Sedum* (Stonecrop). ERICACEAE: *Vaccinium* (Bilberry). SAXIFRAGACEAE: *Saxifraga* (Saxifrage).

113. *Parnassius phoebus behrii* Edw. **Pl. III, fig. f**

BEHR'S PARNASSIAN is well established on the eastern slope of the Sierra Nevada, as befits its affinities with the Great Basin fauna. The arid eastern exposures of many ridges west of the Sierran divide, with the persistent association of Juniper and *Sedum* (Stonecrop), have served to lure this butterfly westward through Tioga Pass to Yosemite Creek: It also flies in the *Potentilla fruticosa* zone of the Alpine Rock Garden sub-association of the Alpine Fell-Fields. The larvae and pupae of *P. s. behrii* were first described from specimens secured by the senior author and Edmund Godwin at Rock Creek Lake.

Life Zones: Canadian, Hudsonian, Arctic-Alpine. Plant Communities: Juniper Woodland, Alpine Fell-Fields. Host Plants CRASSULACEAE: *Rhodiola rosea* (Western Roseroot), *Sedum obtusatum*, *S. stenopetalum* (Stonecrop). SAXIFRAGACEAE: *Saxifraga* (Saxifrage).

HESPERIIDAE

114. *Epargyreus clarus* (Cram.)
Syn. *Epargyreus tityrus* (Fabr.)

THE SILVER-SPOTTED SKIPPER is a widely distributed species recognizable by its large size and the conspicuous silvery spot on the under side of each hind wing. It frequents the flowers of California Buckeye, *Aesculus californica,* a well known tree of the western foothills, and is favored by plantings of Locust as an ornamental.

Life Zones: Upper Sonoran. Plant Communities: Foothill Woodland, Yellow Pine Forest. Host Plants: LEGUMINOSAE: *Robinia* (Introduced Black Locust), and other legumes.

115. *Thorybes pylades* (Scud.)

THE NORTHERN DUSKY-WING is the low-elevation species of this genus in California. It is larger but has smaller spots on the forewing than the following *Thorybes mexicana nevada,* and the male has a costal fold.

Life Zones: Upper Sonoran. Plant Communities: Chaparral, Foothill Woodland, (Yellow Pine Forest). Host Plants: LEGUMINOSAE: *Trifolium* (Clover), and other legumes.

116. ***Thorybes mexicana nevada*** **Scud.**

THE NEVADA DUSKY-WING is the alpine and subalpine *Thorybes* of the Sierra Nevada, flying to 11,000 feet. Smaller and with larger spots than the preceding *T. pylades,* the male has no costal fold and the spots are outlined with a dark rim.

Life Zones: Canadian, Hudsonian, Arctic-Alpine. Plant Communities: Alpine Fell-Fields, Subalpine Forest (Glacial Moraine). Host Plants: Unknown. LEGUMINOSAE: *Amorpha californica* (False Indigo) for the parent species, according to Comstock and Dammers (1933).

117. ***Thorybes diversus*** **Bell** **Pl. I, fig. a**

BELL'S DUSKY-WING is easily confused with The Northern Dusky-Wing, *Thorybes pylades,* being of similar size, but lacks the costal fold in the male. A denizen of grassy openings in the forest belt, it shuns the broad, open meadows.

Life Zones: Transition. Plant Communities: Openings in several types of Forest. Host Plants: Not known.

118. ***Pyrgus ruralis*** **(Bdv.)**

THE TWO-BANDED SKIPPER prefers openings in the forest rather than damp meadows, and is best distinguished by its darker color, even checkering, and montane habitat. Flying close to the ground, it is inconspicuous and easily overlooked.

Life Zones: Canadian. Plant Communities: Openings in Red Fir and Lodgepole Pine Forest. Host Plants: MALVACEAE: *Sidalcea* (Checkerbloom, Wild Hollyhock). ROSACEAE: *Potentilla* (Cinquefoil) suggested.

119. ***Pyrgus communis*** **(Grote)**

THE COMMON CHECKERED SKIPPER is abundant at low elevations, often near habitations where introduced mallow grows. It may be recognized by the conspicuous flight habit, bluish-gray and white checkered pattern, and proximity to human dwellings.

Life Zones: Upper Sonoran, Transition. Plant Communities: Several. Favors weedy growth around cultivated areas. Host Plants: MALVACEAE: especially *Malva* (Mallow) and *Sidalcea* (Checkerbloom). The larvae draw the leaves together with silken threads.

120. ***Heliopetes ericetorum*** **(Bdv.)**

THE LARGE WHITE SKIPPER is a rapid flier, difficult to capture, and hence a rarity. The female is more heavily marked than the male and resembles the foregoing *Pyrgus communis.*

Life Zones: Upper Sonoran (lower Transition). Plant Communities: Chaparral, Foothill Woodland, "Mountain Misery" (*Chamae-*

batia foliosa) belt of cut-over stands of Yellow Pine Forest. Host Plants: AMARANTHACEAE: *Amaranthus* (Pigweed). MALVACEAE: *Malvastrum* (Apricot Mallow).

121. *Erynnis persius* (Scud.)

THE PERSIUS DUSKYWING is a small, dark insect with few contrasting markings. Long misidentified in the west, it has been shown by Burns (unpublished doctoral dissertation) to be common to California at moderate elevations.

Life Zones: (Upper Sonoran) Transition, Canadian. Plant Communities: (Foothill Woodland), Yellow Pine and Fir Forests, both White and Red. Host Plants: Best regarded as unknown. Early records are untrustworthy.

122. ***Erynnis pacuvius lilius*** **(Dyar)**

DYAR'S DUSKYWING, as identified by John Burns, is common at intermediate elevations. Gin Flat, Crane Flat, and similar locations are its usual haunts. One of us (Tilden) found it common on Cowchilla Mountain, outside the park, in June, 1954.

Life Zones: (upper Transition) Canadian. Plant Communities: Chaparral-like understory of montane forests. Host Plants: Unknown. RHAMNACEAE: *Ceanothus* (Snow Bush, Wild Lilac) for Colorado *pacuvius*, as reported by Donald Eff (personal communication).

123. ***Erynnis propertius*** **(Scud. & Burg.)**

THE PROPERTIUS DUSKWING is the largest and commonest of our Duskywings. The front wings have few spots and present a slightly "grizzled" appearance, rather than a solid black effect. It frequents edges and openings in the forest at moderate elevations.

Life Zones: (Upper Sonoran) Transition, Canadian. Plant Communities: Chaparral, Foothill Woodland, Yellow Pine and other Coniferous Forests. Host Plants: FAGACEAE: *Quercus* (Oak), especially Live Oaks of various species.

124. ***Erynnis zarucco funeralis*** **(Scud. & Burg.)**

THE FUNEREAL DUSKYWING is the most easily recognized of our Duskywings. The front wing is pointed and the fringes of the hind wing are white. There is an indistinct brownish patch on the outer third of the forewing that is lacking in the following *Erynnis tristis;* the males also have a tibial tuft.

Life Zones: (Lower Sonoran) Upper Sonoran. Plant Communities: Valley Grasslands, Foothill Woodland (Chaparral). Host Plants: LEGUMINOSAE: *Hosackia* (= *Lotus*) *scoparia, Medicago* (Alfalfa), and other legumes.

125. ***Erynnis tristis*** **(Bdv.)**

THE SAD DUSKYWING may be expected to occur in the oak woodlands and foothills, although it has not yet been found in the Yosemite region. Slightly smaller than the preceding *Erynnis z. fun-*

eralis, and with the forewing not noticeably pointed, it lacks the brown patch on the forewing and the tibial tuft.

Life Zones: Upper Sonoran. Plant Communities: Foothill Woodland, Oak Woodland. Host Plants. FAGACEAE: *Quercus* (Oak).

126a. *Hesperia harpalus harpalus* (Edw.) Pl. II, fig. g
b. *Hesperia harpalus yosemite* Leuss.

THE HARPALUS SKIPPER is the characteristic *Hesperia* of the eastern declivity of the Sierra Nevada and the adjacent Great Basin area surrounding Mono Lake. It is rather pale above, and shows well developed silver spots below, especially in the females. THE YOSEMITE SKIPPER is the subspecies that occurs on the western slope of the Sierra. It is smaller and more brightly colored than normal *harpalus* and the spotting of the under sides of the hind wings tends to be small or to disappear. At high elevations there occurs a "blend-zone" form that is intermediate. The literature treats the Great Basin form as *H. idaho* (Edw.), but there seems no reason for retaining this name.

Life Zones: Transition, Canadian. Of the "blend-zone" population: Hudsonian (Arctic-Alpine). Plant Communities: Not noticeably selective. Host Plants: POACEAE: (Grasses).

127. *Hesperia miriamae* MacNeill Pl. III, fig. m

MIRIAM'S SKIPPER is the most alpine of our skippers, being found entirely above tree line on Mono Pass and on the summits of the higher peaks, such as Unicorn. It is a small, dark species, with large, irregular spots on the under surface of the hind wings. But recently described (MacNeill, 1959), it is still a rarity, and will continue to be so due to the inaccessibility of its habitat.

Life Zones: Arctic-Alpine. Plant Communities: Alpine Fell-Fields. Host Plants: POACEAE (Grasses), presumptively. Actually, unknown.

128. *Hesperia nevada* (Scud.)

THE NEVADA SKIPPER is a Great Basin species found on the eastern Sierra slope from Mono Lake to elevated areas above Tioga Pass. A small species with irregular macular bands on the under side of the hind wings, it frequents open rocky areas at high elevations.

Life Zones: Arid Transition, Canadian, Hudsonian. Plant Communities: Juniper Woodland, Subalpine Forest, Alpine Fell-Fields. Host Plants: POACEAE: Grasses.

129. *Hesperia juba* (Scud.)

THE YUBA SKIPPER is not limited by elevation, being found sparingly across the Sierra crest from the western foothills to the Great Basin. A large species of powerful flight, it may be recognized by the fuscous border of the front wing, which is *sharply limited* and does not grade into the rufous ground color. The under side of the wings is greenish brown to dark brown and the spots are large and usually white.

Life Zones: Unlimited. Plant Communities: Apparently not restricted. Ubiquitous. Host Plants: POACEAE: (Grasses), probably.

130. *Ochlodes sylvanoides* **(Bdv.)**

THE WOODLAND SKIPPER is one of the commonest skippers, ranging across the mountains from the western foothills to the Great Basin and eastward to Colorado. It is a moderate-sized, orange-brown species, with the stigma of the male touching the dusky border of the wing. An unwary species, it may be found fairly swarming on roadside flowers. The Mono Lake population is slightly paler, but differs from Colorado *napa* Edw., a subspecies with which it has been confused.

Life Zones: Upper Sonoran, Transition (Canadian). Plant Communities: Several. Not restricted within its life zones. Host Plants: POACEAE: (Grasses).

131. *Ochlodes agricola* **(Bdv.)**

THE FARMER flies from May in the western foothills to July at higher elevations, but is absent from the east side of the Sierra Nevada. It frequents streamsides, openings in lush woodlands, and overgrown roadsides. Smaller and darker than the preceding *Ochlodes sylvanoides,* it shows pale translucent spots in the forewing, at the end of the stigma in the male, and near the end of the cell in the female. It is seldom found in wet meadows or dry fields.

Life Zones: Upper Sonoran, Transition. Plant Communities: Openings in Forests. Riparian and Roadside Associations. Host Plants: POACEAE: (Grasses).

132a. ***Polites sabuleti sabuleti*** **(Bdv.)**
b. ***Polites sabuleti tecumseh*** **(Grin.)** **Pl. III, fig. d**

THE SANDHILL SKIPPER is found in the Yosemite area, in one form or another, entirely across the Sierran crest, from the western foothills to the Great Basin. About the size of The Woodland Skipper, *Polites s. sabuleti* has the under surface of the hind wings tan, the spots yellowish and extending onto the wing veins, which are also yellow. At higher elevations it is replaced by THE TECUMSEH SKIPPER, which fairly swarms in the subalpine meadows adjacent to Tioga Pass. It is much smaller, darker, brighter, and more greenish than normal *Polites sabuleti.* Its flight season, July to September, is long for an alpine species, perhaps indicating two broods.

Life Zones: Upper Sonoran, Transition for *P. sabuleti;* Canadian, Hudsonian, Arctic-Alpine for *P. s. tecumseh.* Plant Communities: Not restrictive for *P. sabuleti;* Subalpine Meadow, Alpine Meadow and Grassland for *P. s. tecumseh.* Host Plants: CYPERACEAE: *Carex filifolia* (Sedge). Also recorded as LEGUMINOSAE: *Trifolium monanthum* (Clover). The latter, if correct, is a departure from the food preferences of this group, which are characterized as feeding on Monocotyledons.

133. *Polites sonora* (Scud.)

THE SONORAN SKIPPER is the usual mid-summer skipper of intermediate elevations in Yosemite National Park. Resembling the Woodland Skipper, *Ochlodes sylvanoides,* in size and appearance, it is a darker, more olivaceous rufous, with a thicker, more complex stigma. Below, the hind wings are olivaceous tan with a light basal spot and a band of light spots across the wing. A somewhat lighter phase occurs in the higher portions of the Great Basin, as at Mono Lake.

Life Zones: Arid Transition, Canadian, Hudsonian. Plant Communities: Meadowlands, Freshwater Marsh, Alkali Sink; openings in forests of several kinds. Host Plants: Unknown.

134. *Amblyscirtes vialis* (Edw.)

THE ROADSIDE SKIPPER is a widely distributed species, found in the cooler parts of the United States and southern Canada from California to Maine. In the Yosemite region it is a rarity. A dull dun-colored species, of small size, with a few small specks near the tip of the forewing, purplish gray shades on the under surface, and checkered fringes, it frequents cool, moist spots, such as meadow edges and forest clearings, at elevations of from 4,000 to 7,000 feet.

Life Zones: Transition, Canadian. Plant Communities: Not known for the Yosemite region. Host Plants: POACEAE: (Grasses) in the eastern United States; has not been reared in the west.

LITERATURE CITED

BADE, WILLIAM F. 1924. The life and letters of John Muir. In two volumes. Vol. I: vii 399 pp. Houghton Mifflin, Boston & New York.

BAUER, DAVID L. 1961. Tribe Melitaeini, Checker Spots, Crescents, and Patch Butterflies, pp. 127-146. *In*: Ehrlich, Paul R., and Anne H. How to know the Butterflies. 262 pp. Wm. C. Brown, Dubuque, Iowa.

BROWN, F. MARTIN. 1954. Colorado Butterflies. Part I. Satyridae. *Proc. Denver Mus. Nat. Hist.,* No. 3: 1-32.

——— 1955. Studies of Nearctic *Coenonympha tullia* (Rhopalocera, Satyridae.) *Coenonympha tullia inornata* Edw. *Bull. Amer. Mus. Nat. Hist.,* 105 (4): 363-409.

CLENCH, HARRY. 1961. Tribe Theclini, Hairstreaks, pp. 177-220. Tribe Lycaenini, The Coppers, pp. 220-228. *In*:Ehrlich, Paul R., and Anne H. How to know the Butterflies. 262 pp. Wm. C. Brown, Dubuque, Iowa.

COMSTOCK, JOHN A. 1927. Butterflies of California. 334 pp., 63 pls. Author, Los Angeles.

DAVENPORT, DEMOREST. 1941. The butterflies of the satyrid genus *Coenonympha. Bull. Mus. Comp. Zool., Harvard,* 87(4): 215-349, pls. 1-10.

DICE, LEE R. 1943. The biotic provinces of North America. vii + 78 pp., 1 map Univ. Michigan Press, Ann Arbor.

DOS PASSOS, C. F., and L. P. GREY. 1947. Systematic catalogue of *Speyeria* (Lepidoptera, Nymphalidae) with designations of types and fixations of type localities. *Amer. Mus. Novitates,* No. 1370: 1-30.

DOWNEY, JOHN C. 1961. Tribe Plebejini, The Blues, pp. 228-242. *In*: Ehrlich and Ehrlich. How to Know the Butterflies. 262 pp. Wm. C. Brown, Dubuque, Iowa.

EMMEL, THOMAS C., and JOHN F. EMMEL. 1962. Ecological studies of Rhopalocera in a High Sierran community—Donner Pass, California. I. Butterfuly associations and distributional factors. *J. Lepid. Soc.,* 16: 23-44.

——— 1963. Larval food-plant records for six western Papilios. *J. Res. Lepid.,* 1(3): 191-193.

ERIKSEN, C. H. 1962. Further evidence of the distribution of some boreal Lepidoptera in the Sierra Nevada. *J. Res. Lepid.,* 1(1): 89-93. /

EHRLICH, PAUL R., and ANNE H. EHRLICH. 1961. How to know the butterflies. vi+ 262 pp., 524 figs. Wm. C. Brown, Dubuque, Iowa.

GARTH, JOHN S. 1935a. Butterflies of the Boundary Hill Research Reserve, Yosetmite National Park, California. *Bull. Sou. Calif. Acad. Sci.,* 33: 131-135.

——— 1935b. Butterflies of Yosemite National Park. *Ibid.,* 34: 37-75.

GRINNELL, JOSEPH, and HARVEY M. HALL. 1919. Life-zone indicators in California. *Proc. Calif. Acad. Sci.,* 9(2): 37-67.

———, and TRACY T. STORER. 1924. Animal life in the Yosemite. xviii + 752 pp., 62 pls., 65 figs. Univ. Calif. Press, Berkeley.

GUNDER, JEAN D. 1929. The genus *Euphydryas* Scud. of Boreal America (Lepidoptera, Nymphalidae). *Pan-Pac. Ent.,* 6(1): 1-8, pls. 1-12, maps 2.

HALL, HARVEY M., and CARLOTTA C. HALL. 1912. A Yosemite flora. vii + 282 pp. Paul Elder, San Francisco.

HEMMING, FRANCIS. 1934. Generic names of Holarctic butterflies. 184 pp. British Museum (Natural History), London.

HIGGINS, L. G. 1953. Butterfly collecting in U.S.A. *Entomologist,* 86(9): 207-210.

HOVANITZ, WILLIAM 1940. Ecological color variation in a butterfly and the problem of "protective coloration." *Ecol.,* 21(3): 371-380.

———. 1943. Hybridization and seasonal segregation in two races of a butterfly occurring together in two localities. *Biol. Bull.* 85: 44-51.

———. 1950. The biology of *Colias* butterflies. I. The distribution of the North American species. *Wasmann J. Biol.,* 8(1): 49-75.

———. 1963. Evidence for the species distinction of *Pieris protodice* and *Pieris occidentalis. J. Res. Lepid.* 2: in press.

KLOTS, ALEXANDER B. 1936. The interrelationships of the species of the genus *Lycaena* Fabricius (Lepidoptera, Lycaenidae). *Bull. Brooklyn Ent. Soc.,* 31(4): 154-170.

———. 1951. A field guide to the butterflies of North America, east of the Great Plains. xvi + 349 pp., 40 pls., 9 figs. Houghton Mifflin, Boston.

LINDSEY, ARTHUR W. 1942. A preliminary revision of *Hesperia. Denison Univ. Bull., Jour. Sci. Labs.,* 37: 1-50, pls. 1-6.

———, E. L. BELL, and R. C. WILLIAMS. 1931. Hesperioidea of North America. *Ibid.,* 26: 1-142.

MATTHES, FRANCOIS E. 1930. Geologic History of the Yosemite Valley. *Geol. Surv. Professional Paper* 160: 1-137, 52 pls.

MacNEILL, C. DON. 1959. A new species of *Hesperia* from California (Lepidoptera: Hesperiidae). *Wasmann J. Biol.,* 17(1): 89-94.

McDUNNOUGH, J. 1938. Check list of the Lepidoptera of Canada and the United States of America. Part I. Macrolepidoptera. *Mem. Sou. Calif. Acad. Sci.,* 1: 1-275.

MUNZ, PHILIP A., and DAVID D. KECK. 1949. California plant communities. *El Aliso,* 2(1): 87-105. 1950. (Same title)—Supplement. *Ibid.,* 2(3): 199-202.

NABOKOV, VLADIMIR. 1949. The Nearctic members of the genus *Lycaeides* Hbl. *Bull. Mus. Comp. Zool.,* Harvard, 101: 479-541.

OPLER, PAUL, and JERRY A. POWELL. 1961. Taxonomic and distributional studies on the western components of the *Apodemia mormo* complex (Riodinidae). *J. Lepid. Soc.,* 15(3): 145-171.

TILDEN, J. W.. 1959. The butterfly associations of Tioga Pass. *Wasmann J. Biol.,* 17(2): 249-271.

VESTAL, A. G. 1914. Internal relations of terrestrial associations. *Amer. Nat.,* 48: 413-445.

WILLIAMS, C. B. 1930. The migration of butterflies. Oliver and Boyd, Edinburgh.

ZIEGLER, J. BENJAMIN. 1960. Preliminary contribution to a redefinition of the genera of North American hairstreaks (Lycaenidae) north of Mexico. *J. Lepid. Soc.,* 14: 19-23.

YOSEMITE BUTTERFLY RECORDS

The documented records on which the textual material rests have been segregated from the body of the article (Appendix I) because of its length; however these localities are of great importance to specialists interested in the specific locations where these species may be found.

West-slope records precede east-slope records and are separated from them by a period. Each locality is followed by all subsequent records from that locality, first by the same observer, then by other observers. Localities are separated by a semi-colon. Apart from these intended departures an exact chronology is maintained.

Following the abbreviated locality and date (day, MONTH, and year), the initials of the responsible observer are given. These are John S. Garth (JSG), Edmund D. Godwin (EDG), Allan Oakley Shields (AOS), J. Wilson Tilden (JWT), and Keith Trexler (KT). Others who contributed an occasional record are named with the appropriate citation.

LOCALITIES AND ABBREVIATIONS

To conserve space in the body of the list a standard set of abbreviations has been adopted, (Appendix II) following the practice established by entomological reports of a similar nature (Garth, 1935b): Localities represented extend from Briceburg and Buck Meadows at the western approaches to Yosemite National Park to Mono Lake at the eastern Gateway, and from Conway Summit on the north to Deadmans Summit on the south along U. S. Highway 395. (A few localities, such as Cathay and Oakhurst on the west side and Bridgeport and Casa Diablo Hot Springs on the east side, transcend even these limits.) Some are in the National Park, some are in the surrounding National Forests, while some are outside of either. Localities outside Yosemite National Park are identified by National Forest (NF), of if outside the National Forest, by California County (Co.). Each locality is characterized by Life Zone and Plant Community; the division into west slope and east slope suffices to indicate the Biotic Province. Elevations (7214, 10,500) are in feet and are taken from U. S. D. I. Geological Survey Topographical Maps of Yosemite (1948) or of adjacent Quadrangles. These are accurate to the nearest 100-foot contour except in the case of mountain peaks, lake levels, or places of habitation, where precise figures (BM) can be given.

APPENDIX I

SOME PLANTS ON WHICH YOSEMITE BUTTERFLIES FEED AS LARVAE

o = oviposition observed; 1 = larva taken from; r = reared to adult on plant named; ? = doubtful record; * = feeding on more than one plant

AMARANTHACEAE			
Amaranthus	Pigweed	**Heliopetes ericetorum*	
ASCLEPIADACEAE			
Asclepias	Milkweed	*Danaus plexippus*	o, 1, r
		Danaus g. strigosus	
BETULACEAE			
Alnus	Alder	**Papilio rutulus*	1, r
		**Polygonia f. rusticus*	
BORAGINACEAE			
Amsinckia	Fiddle-Neck	**Vanessa cardui*	1, r
Cryptantha	Nievitas	**Vanessa cardui*	1, r
Cynoglossum	Hound's Tongue	**Strymon melinus*	
Mertensia	Mertensia	*Euphydryas c. sierra*	
CAPPARIDACEAE			
Cleome	Bee Plant	**Pieris protodice*	o, 1, r
Isomeris	Bladder Pod	**Pieris beckeri*	o, 1, r
CAPRIFOLIACEAE			
Symphoricarpus	Snow Berry	**Euphydryas chalcedona*	o, 1, r
CARYOPHYLLACEAE			
Stellaria	Chickweed	**Nathalis iole*	
CHENOPODIACEAE			
Atriplex	Salt Bush	**Brephidium exilis*	
Chenopodium	Lamb's Quarters	**Brephidium exilis*	r
COMPOSITAE			
Anaphalis	Everlasting	**Vanessa virginiensis*	1
Antennaria	Everlasting	**Vanessa virginiensis*	1
Artemesia	Mugwort	**Vanessa virginiensis*	
Aster	Aster	**Melitaea acastus*	
		?*Melitaea d. malcolmi*	
		Phyciodes campestris	
Carduus	Thistle	**Phyciodes mylitta*	o, 1, r
		**Vanessa cardui*	o, 1, r

Cirsium	Thistle	*Phyciodes mylitta	o, l, r
		*Vanessa cardui	o, l, r
Dyssodia	(none)	*Nathalis iole	
Gnaphalium	Cud Weed, Everlasting	*Vanessa virginiensis	l
Helenium	Sneeze Weed	*Nathalis iole	
Silybum	Milk Thistle	*Phyciodes mylitta	
CONVOLVULACEAE			
Cuscuta	Dodder	*?Callophrys iroides	
CORNACEAE			
Cornus	Dogwood	*Celastrina argiolus	l, r
CRASSULACEAE			
Rhodiola	Roseroot	*Parnassius p. behrii	l
Sedum	Stonecrop	*Parnassius c. baldur	
		*Parnassius p. behrii	l
CRUCIFERAE			
Arabis	Rock Cress	Anthocharis lanceolata	o
		*Anthocharis sara	o, l, r
		*Euchloe ausonides	o, l, r
		*Euchloe creusa	
		*Pieris occidentalis	
		*Pieris protodice	
		*Pieris sisymbrii	
Barbarea	Winter Cress	*Pieris napi	
Brassica	Mustard	*Anthocharis sara	o
		*Pieris beckeri	
		*Pieris napi	
		*Pieris protodice	o, l, r
		*Pieris rapae	o, l, r
Caulanthus	Rock Cabbage	*Pieris sisymbrii	o, l, r
Dentaria	Milk Maids	*Pieris napi	o, l, r
Erysimum	Wall Flower	*Euchloe ausonides	
Lepidium	Pepper Grass	*Pieris occidentalis	o, l
		*Pieris protodice	o, l
Radicula	Water Cress	*Pieris rapae	
Raphanus	Radish	*Pieris napi	
		*Pieris protodice	o
Sisymbrium	Hedge Mustard	*Anthocharis sara	o
		*Euchloe ausonides	o, l
		*Pieris beckeri	
		*Pieris occidentalis	
		*Pieris protodice	o
		*Pieris sisymbrii	
Stanleya	Desert Plume, Prince's Plume	*Pieris beckeri	l, r
Streptanthus	Jewel Flower	*Euchloe creusa	
		*Pieris sisymbrii	
Thlaspi	Penny Cress	*Pieris protodice	

ERICACEAE

Arbutus	Madroño	*Callophrys iroides	
Arctostaphylos	Manzanita	*Callophrys iroides	
		*Celastrina argiolus	l, r
Rhododendron	Azalea	*Polygonia f. rusticus	
		*Polygonia zephyrus	
Vaccinium	Bilberry, Huckleberry	*Callophrys iroides	
		Colias behrii	o, l,
		*?Parnassius c. baldur	

FAGACEAE

Quercus	Oak	Limenitis b. californica	
		*Celastrina argiolus	r
		Erynnis propertius	r
		Erynnis tristis	
		Habrodais grunus	
		?Strymon auretorum	
		*?Strymon californica	

GERANIACEAE

Erodium	Filaree	*Nathalis iole	

GUTTIFERAE

Hypericum	St. John's Wort	*Strymon melinus	

LABIATAE

Hyptis	Bee Sage	*Strymon melinus	

LAURACEAE

Umbellularia	Laurel	*?Papilio multicaudatus	

LEGUMINOSAE

Amorpha	False Indigo	Colias eurydice	o, l
		Thorybes mexicana	
Astragalus	Loco Weed, Rattle Weed	*Colias eurytheme	o, l
		*Everes amyntula	
		*Everes comyntas	
		*Glaucopsyche lygdamus	
		*Hemiargus isolus	
		*Lycaeides melissa	o
		*Plebejus acmon	
		*Strymon behrii	
		*Strymon melinus	
Dalea	(Includes Smoke Tree)	*Leptotes marina	
Glycyrrhiza	Liquorice	*Lycaeides melissa	
Hosackia		*?Celastrina argiolus	
(= Lotus)		*Colias eurytheme	o, l, r
		*?Erynnis z. funeralis	
		*Glaucopsyche lygdamus	
		*Hemiargus isolus	
		*Lycaeides melissa	
		*Plebejus acmon	o

		*Plebejus saepiolus	o (2nd brood)
		*Strymon behrii	
		*Strymon melinus	o, 1, r
Lathyrus	Sweet Pea	*Everes amyntula	
		*Glaucopsyche lygdamus	
Lupinus	Lupine	*?Celastrina argiolus	
		*Glaucopsyche lygdamus	
		?Lycaeides a. anna	
		*Lycaeides melissa	
		Phaedrotes piasus	
		Plebejus icarioides	o, 1
		Strymon fuliginosum	
		*Strymon melinus	o, 1, r
Medicago	Alfalfa	*Colias eurytheme	o, 1, r
		*Erynnis z. funeralis	
		*Leptotes marina	
		*Lycaeides melissa	
Melilotus	Sweet Clover	*Colias eurytheme	o
Robinia	Black Locust	Epargyreus clarus	
Thermopsis	False Lupine	*Colias eurytheme	
Trifolium	Clover	Colias philodice hageni	o, 1, r
		*Colias eurytheme	o
		*Everes comyntas	
		*Hemiargus isolus	
		*Plebejus saepiolus	o (1st brood)
		?Polites sabuleti	
		Thorybes pylades	
Vicia	Vetch	*Colias eurytheme	o, 1
		*Everes amyntula	o
		*Everes comyntas	
		*Glaucopsyche lygdamus	

LORANTHACEAE

Arceuthobium	Dwarf Mistletoe	Callophrys johnsoni	
		Callophrys spinetorum	1, r
Phoradendron	Mistletoe	Atlides halesus	1, r

MALVACEAE

Lavatera	Tree Mallow	*Vanessa carye	
Malva	Mallow	*Strymon melinus	r
		*Vanessa carye	o, 1, r
		*Pyrgus communis	1, r
Malvastrum	Apricot Mallow	*Heliopetes ericetorum	
Sida	Alkali Mallow	*Vanessa carye	
Sidalcea	Checkerbloom, Wild Hollyhock	*Pyrgus communis	
		*?Pyrgus ruralis	
		*Vanessa carye	o, 1, r
Sphaeralcea	Bush Mallow, Apricot Mallow	*Vanessa carye	

ONAGRACEAE

Gayophytum		*Lycaena helloides	

OLEACEAE			
Fraxinus	Ash	*Papilio multicaudatus	
PINACEAE			
Libocedrus	Incense Cedar	Callophrys nelsoni, probably	
Pinus	Pine	Callophrys eryphon	
		*Neophasia menapia	
Pseudotsuga	Douglas Fir	*Neophasia menapia	
PLANTAGINACEAE			
Plantago	Plantain	Euphydryas editha	o, l, r
		*Precis o. evarete	o, l, r
POLYGONACEAE			
Eriogonum	Buckwheat	Apodemia mormo	
		Callophrys dumentorum	o
		?Callophrys lemberti	
		Lycaena gorgon	o
		Lycaena heteronea	
		?Lycaena nivalis	
		Philotes battoides	
		Philotes enoptes	o
		*Plebejus acmon	
		?Plebejus lupini	
Oxytheca	(none)	*Lycaena helloides	
		Philotes speciosa	
Polygonum	Knot Weed	*Lycaena helloides	
		*Lycaena mariposa	
		*Strymon melinus	
Rumex	Dock, Sorrel	*Lycaena editha	o
		*Lycaena helloides	o
		*Lycaena mariposa	
		?Lycaena p. hypophlaeas	
		?Lycaena rubidus	
		Lycaena xanthoides	o
RHAMNACEAE			
Ceanothus	Snow Bush	*Callophrys iroides	l, r
		*Celastrina argiolus	l, r
		Erynnis pacuvis	
		*Papilio eurymedon	
		Nymphalis californica	l
		Strymon californica	l, r
		Strymon saepium	l, r
Rhamnus (= Frangula)	Cascara, Buckthorn, Coffee Berry	*Papilio eurymedon	l, r
ROSACEAE			
Amelanchier	Service Berry	*Papilio multicaudatus	
Cercocarpus	Mountain Mahogany	Strymon adenostomatis	l, r
		Strymon californica	l, r
		Strymon saepium	

Potentilla (= _Horkelia_)	Cinquefoil	*_Lycaena_ _editha_	
		*?_Pyrgus_ _ruralis_	
Prunus (= _Cerasus_)	Choke Cherry	*_Limenitis_ _lorquini_	1
		*_Papilio_ _multicaudatus_	
		*_Papilio_ _rutulus_	1, r
Purshia	Antelope Bush	_Strymon_ _fuliginosum_	
Spiraea	Spirea	*_Celastrina_ _argiolus_	
RUTACEAE			
Ptelea	Hop Tree	*_Papilio_ _multicaudatus_	
SALICACEAE			
Populus	Poplar	*_Limenitis_ _lorquini_	1
		*_Limenitis_ _w._ _nevadae_	
		*_Nymphalis_ _antiopa_	o, 1, r
		*_Papilio_ _multicaudatus_	
		*_Papilio_ _rutulus_	o, 1, r
Salix	Willow	*_Limenitis_ _lorquini_	
		*_Limenitis_ _w._ _nevadae_	
		*_Nymphalis_ _antiopa_	o, 1, r
		*_Papilio_ _multicaudatus_	
		*_Papilio_ _rutulus_	
		*?_Polygonia_ _f._ _rusticus_	
		Strymon _dryope_	1, r
		Strymon _sylvinus_	1, r
SAPINDACEAE			
Aesculus	Horse Chestnut (includes Buckeye)	*_Celastrina_ _argiolus_	1, r
SAXIFRAGACEAE			
Glossularia	Gooseberry	*_Lycaena_ _arota_	o, 1, r
		*_Polygonia_ _f._ _rusticus_	
		*_Polygonia_ _zephyrus_	
Ribes	Currant	*_Lycaena_ _arota_	
Saxigraga	Saxifrage	*_Parnassius_ _c._ _baldur_	
		*_Parnassius_ _p._ _behrii_	
SCROPHULARIACEAE			
Castilleja	Paint Brush	*_Melitaea_ _acastus_	
		*_Melitaea_ _leanira_	
Cordylanthus	Bird's Beak	*_Melitaea_ _leanira_	
Diplacus	Sticky Monkey Flower	*_Euphydryas_ _chalcedona_	o, 1, r
Mimulus	Monkey Flower	*_Euphydryas_ _chalcedona_	
		*_Precis_ _o._ _evarete_	
Penstemon	Penstemon	*_Euphydryas_ _chalcedona_	
Scrophularia	Figwort, Bee Plant	*_Euphydryas_ _chalcedona_	o, 1, r

ULMACEAE			
Ulmus	Elm	**Nymphalis antiopa*	o, 1, r
UMBELLIFERAE			
Daucus	Wild Carrot	**Papilio zelicaon*	1, r
Foeniculum	Fennel, Anise	**Papilio zelicaon*	o, 1, r
Heracleum	Cow Parsnip	**Papilio zelicaon*	1, r
Pteryxia		*Papilio indra*	
URTICACEAE			
Boehmeria	False Nettle	**Vanessa atalanta*	
Parietaria	Pellitory	**Vanessa atalanta*	
Urtica	Nettle	*Nymphalis milberti*	
		Polygonia satyrus	1, r
		**Vanessa atalanta*	1, r
VIOLACEAE			
Viola	Violet	*Argynnis* (all)	
		Boloria epithore	

THREE ANOMALOUS SITUATIONS

While the regularity of zonal progression and the exclusiveness of biotic provinces have been emphasized, certain irregularities occur that are of sufficient interest to the lepidopterist to warrant considration. The first of these may be found at Tioga Pass, where the loosely consolidated moraines provide a situation duplicating the alpine rock garden. Within a few feet of these moraines may be seen flying the Arctic-Alpine butterflies, *Oeneis chryxus ivallda* and *Euphydryas editha nubigena,* species that normally occur above timber line, a thousand or more feet higher. The explanation is believed to be found in drainage, both of air that funnels through the pass and cools the ground sufficiently to permit the growth of Alpine Willow, and of water that enables these slightly elevated rock piles to become snow-free with the first rays of summer sun, and to flower a month before the Alpine Fell-Fields above.

A second paradoxical situation occurs at timberline, as along the Gaylor Lakes trail above Tioga Pass, where at an approximate elevation of 10,500 feet may be found Artemesian species that normally occur at Mono Lake, 4,000 feet below. *Cercyonis oeta, Lycaena rubidus, L. heteronea,* and *Hemiargus isolus* are found in a sage-brush environment much like Mono Lake, but with *Artemesia rothrockii*, rather than *A. tridentata*, as the sage, and with *Eriogonum latifolium* and *Aplopappus* sp. as the plant associates. The butterflies are not "fly-ups" from below, but appear to be permanently established on these brushy summits. Here the tie to a plant community, the Sagebrush Scrub, seems stronger than the restriction to a particular life zone or altitudinal belt. Thus one may, after observing "Arctic-Alpine" butterflies at Tioga Pass, nominally Hudsonian, ascend a thousand feet and observe "Upper Sonoran" butterflies flying at tree-line!

While normally the Sierran Crest divides the Californian biotic province from the Artemesian, a series of lesser crests to the westward support Western Juniper on their eastern slopes, and with it the Juniper-Woodland butterflies, *Parnassius phoebus behrii, Euchloe ausonides coloradensis,* and *Hesperia nevada.* It is therefore not necessary to travel to the eastern slope of the Sierra Nevada to observe Great Basin butterflies; many of these have infiltrated the mountain passes and may be found in favored situations as far west as Yosemite Creek, well within the central portion of the park.

APPENDIX II

YOSEMITE RECORDS

SATYRIDAE

1a. Coenonympha tullia californica West. & Hew. El Portal 28-VI-33 (JSG); Mather 12-VII-56 (JSG), 14-V-61 (JWT); Crane Flat 18-VIII-57 (JWT); Jerseydale 30-V-59 and 11-VI-61 (JWT), 26-VI-59 (JSG), 30-VIII-60 (AOS); Briceburg 21-III-61 (KT); Cliff House 9-VI-61 (JWT).

b. Coenonympha tullia mono Burdick Mono Lake 3 to 5-VII-38 and 23-VI-62 (JWT), 30-VI-58 and 12-VI-62 (AOS); W of Lee Vining 26 to 28-VI-61 (AOS, common).

2. Cercyonis pegala ariane (Bdv.) Mono Lake 17-VII-57 (JWT), 16 to 20-VII-58 and 13-VII-60 (AOS); 10 miles E of Mono Lake 24-VII-59 (AOS).

3. Cercyonis silvestris (Edw.) El Portal 28-VI-33 (JSG), 10-VI-61 (JWT); Pate 23-VII-34 (EDG); Benson 24-VII-34 (EDG); Hetch-Hetchy 13 to 15-VII-56 (JSG); Indian Flat 30-V-59 (JWT, seen), 10-VI-61 (JWT); Jerseydale 26-VI-59 (JSG), 11-VI-61 (JWT); Cathay 11-VI-61 (JWT).

4. Cercyonis oeta(Bdv.) Tioga Pass 19-VIII-52 (JWT); Crest W of Tioga Pass 6-VIII-57, 31-VII to 20-VIII-58 and 23 to 28-VII-60 (AOS); Upper Gaylor Lakes 1-VIII-58 (JSG), 20-VIII-58 (AOS); Pilot Peak 31-VIII-58 (JWT). Bodie 18-VII-57 (AOS); June Lake 14 to 22-VIII-57 (JSG); Mono Lake 6-VII-58 (AOS), 23-VI-62 (JWT); Warren Creek 21 to 28-VII-58, 11-VIII-60 and 26-VI-61 (AOS); Agnew Pass and Thousand Island Lake 5-VIII-59 (AOS).

5. Oeneis chryxus ivallda (Mead) Dana, W slope 7-VII-31 (JWT); Florence 5-VIII-33 (JSG); Lyell 6-VIII-33 (JSG); Dana 8-VIII-33 (JSG); Slide 1-VIII-34 (EDG); Pilot Peak 16-VIII-52 and 18-VII-57 (JWT); Crest W of Tioga Pass 12 to 15-VII-57 and 9-VII to 19-VIII-58 (AOS); Tioga Pass 10-VII-58 (AOS); Helen Lake 18 to 29-VII-58 (AOS); Cockscomb 26-VII-58 (AOS); Dana, N slope 31-VII-58 (AOS); Upper Gaylor Lake 1-VIII-58 (JSG); Vogelsang Pass 3-VIII-58 (JSG); Bert Lake 9-VIII-58 (AOS); Unicorn 12-VIII-58 (AOS).

DANAIDAE

6. Danaus (Danaus) plexippus (Linn.) Camp 9, Yosemite Valley, 23-VII-33 (JSG); Yosemite Creek 7-VII-56 (JSG); Mather 11 and12-VII-56 (JSG); Crane Flat 19-VII-57 (JWT); Darrah, Jerseydale, and Indian Flat 29 and 30-V-59 (JWT, seen); Jerseydale and Cathay 11-VI-61 (JWT). Mono Lake 30-VI-41 (JSG, seen), 23-VI-62 (JWT).

7. Danaus (Tasitia) gilippus strigosus (Bates) Mono Lake 30-VI-30 (JWT, seen); 16-VII-58 (AOS).

NYMPHALIDAE

8. Argynnis (Semnopsyche) cybele leto Behr Camp 9, Yosemite Valley, 23-VII to 2-VIII-33 (JSG).

9. Argynnis (Speyeria) nokomis apacheana Skin. Mono Lake 13-VIII-50 and 15-VIII-51 (JWT), 22 to 26-VIII-57, 25-VIII-58, and 4-VIII-60 (AOS); Gull Lake 14 to 28-VIII-57 (JSG), 2-IX-58 (JWT).

10 a. Argynnis (Speyeria) zerene zerene Bdv. Wawona 20-VII-33 (JSG); Jerseydale 21 to 24-VI-56, 19-VI-58, and 9 to 13-VI-62 (AOS); Mather 11 to 15-VII-56 (JSG); Hetch-Hetchy Summit 13-VII-56 (JSG); Aspen

Valley 14-VII-56 (JSG); Yosemite Creek Trail 17-VII-56 (JSG); Crane Flat 19-VIII-57 (JWT).

b. Argynnis (Speyeria) zerene malcolmi Comst. Agnew Pass 13-VIII-57 and 5-VIII-59 (AOS); Mono Lake 26-VIII-57 (AOS); Lundy 20-VII-58 (AOS); Warren Creek 28-VIII-58 (AOS); Casa Diablo 2-IX-58 (JWT).

11a. Argynnis (Speyeria) callippe inornata Edw. Jerseydale 21-VI-56, 23-VI-57, 5-VII-60, 21 to 23-VI-61 and 9 to 13-VI-62 (AOS); El Portal 30-V-58 (JWT); Oakhurst, Madera County, 24-VI-62 (JWT).

b. Argynnis (Speyeria) callippe nevadensis Edw. Mono Lake 15-VII-38, 30-VI-50 and 23-VI-62 (JWT), 7-VII-58 (AOS); Above Crowley Lake 29-VI-41 (JSG); Bodie 18-VII-57 (AOS); 5 miles N of Mono Lake 28-VI-61 (AOS).

12. Argynnis (Speyeria) egleis Bdv. Eagle Peak 1-VII-33 (JSG); Reserve 16-VII-33 (JSG); Dana 8-VIII-33 (JSG); Pate 23-VII-34 (EDG); Yosemite Creek 9-VII-56 (JSG); Mather 12-VII-56 (JSG); Hetch-Hetchy Summit 13-VII-56 (JSG); Smoky Jack 4-VII-57 (JWT); Gin Flat 12 to 19-VII-57 (JWT); Lembert Dome 24-VII-57 (AOS); Crest W of Tioga Pass 6-VIII-57, 19-VIII-58, 1-VIII-59 and 14-VIIto 2-VIII-60 (AOS); Crane Flat 18-VIII-57 (JWT); Pilot Peak 30 to 31-VIII-58 (JWT); Unicorn 27-VII-59 (AOS); Glen Aulin 25-VII-60 (AOS). June Lake 14-VIII-57 (JSG); Lundy 20-VII-58 (AOS); Warren Creek 21-VII-58 (AOS).

13. Argynnis (Speyeria) atlantis irene Bdv. Coldwater 3-VIII-34 (EDG); Tenaya 4-VIII-34 (EDG); Aspen 14-VII-56 (JSG); 5 miles W of Lower Ottoway Lake 19-VIII-61 (AOS).

14. Argynnis (Speyeria) hydaspe Bdv. Camp 19, Yosemite Valley 5-VII-33 (JSG); Ledge 9-VII-33 (JSG); Glen Aulin 10-VIII-33 (JSG); Pate 23-VII-34 (EDG); Buck Meadow 4-VII-54 (JWT); Crane Flat 4-VII-54 (JWT); Jerseydale 28-VI-56, 15 to 16-VI-58, 18-VI and 4-VII-60 (AOS), 26-VI-59 (JSG); Mather 12-VII-56 (JSG); Hetch-Hetchy Summit 13 to 17-VII-56 (JSG).

15. Argynnis (Speyeria) mormonia arge Stkr. Tioga Pass 13-VIII-29 (JSG), 14-VII-31, 12 to 13-VIII-50, and 16-VIII-57 (JWT), 4-VIII-57, 19-VIII-58 and 1-VIII-59 (AOS); Dana 8-VIII-33 (JSG); Coldwater 3-VIII-34 (EDG); Crane Flat 19-VII to 19-VIII-57 (JWT); Tuolumne Meadows 18-VII to 14-VIII-57 and 3-IX-58 (JWT), 15 to 21-VIII-58 (AOS); Pilot Peak 15-VIII-57 and 3-VIII-58 (JWT); Dana, W slope 16-VIII-57 and 30-VIII-58 (JWT); Lyell Fork 10-VIII-58 and 3-VIII-59 (AOS); Gaylor Lakes 31-VIII to 3-IX-58 (JWT); Elizabeth Lake 27-VII-59 (AOS). Warren Creek 11-VIII-60 (AOS).

16. Boloria (Clossiana) epithore (Edw.) Tioga Pass 7-VII-31 (JWT); Eagle Peak 1-VII-33 (JSG); Ledge 9-VII-33 (JSG); Reserve 16-VII-33 and 7 to 10-VII-56 (JSG); Yosemite Creek 7 to 17-VII-56 (JSG); White Wolf 10-VII-56 and 24-VI-59 (JSG); Aspen Valley 14-VII-56 (JSG); Crane Flat 19-VII-57 and 10-VI-61 (JWT), 24-VI-61 (AOS, abundant); Tenaya 11-VII-58 (AOS); Badger Pass 23-VI-59 (JSG); Glacier Point 23-VI-59 (JSG); Tamarack 24-VI-59 (JSG).

17a. Euphydryas chalcedona chalcedona (Dbldy. & Hew.) El Portal 28-VI-33 (JSG), 14-V-61 (JWT) ; Glacier 9-VII-33 (JSG); Jerseydale 16 to 19-VI-57, 15 to 19-VI-58 and 9 to 13-VI-62 (AOS); Darrah and Jerseydale 30-V-59 (JWT); Indian Flat 30-V-59 and 14-V-61 (JWT).

b. Euphydryas chalcedona sierra (Wgt.) Return Creek 11-VII-31 (JWT); Eagle Peak 1-VII-33 (JSG); Reserve 14-VII-33 (JSG).

18a. Euphydryas editha rubicunda Hy. Edw. El Portal 8-V-32 (R. G. Wind), 14-V-61 (JWT); Jerseydale 15 to 18-VI-58 and 9 to 13-VI-62 (AOS);Indian Flat 30-V-59, 27-V-60 and 13-V-61 (JWT).

b. Euphydryas editha nubigena (Behr) Tioga Pass 7-VII-31, 19-VII-52 and 18-VII-57 (JWT), 29-VII-56, 8 to 13-VII-57, 9-VII to 24-VIII-58, 20 to 23-VII-60 and 25-VI-61 (AOS), 1-VIII-58 (JSG); Pilot Peak 18-VII to 15-VIII-57 (JWT); Helen Lake 18 to 29-VII-58 (AOS); Gaylor Lakes Trail 19-VII-58 (JWT); Dana, W slope 20-VII-58 (JWT); Rafferty Creek 3-VIII-58 (JSG); Vogelsang Lake 3-VIII-58 (JSG).

c. Euphydryas editha monoensis Gund. Mono Lake, near Lee Vining 4-VII-28 and 30-VI-50 (JWT); 19-VI-54 (JSG), 30-VI to 16-VII-58, 13-VII-60 and 26 to 27-VI-61 (AOS).

19. Melitaea (Chlosyne) damoetas malcolmi Comst. Dana, W slope 17-VII-31 (JWT); Lyell 6-VIII-33 (JSG); Dana 8-VIII-33 (JSG); Pilot Peak 16-VIII-52 and 18-VII-57 (JWT); Upper Gaylor Lake 31-VII-57 and 9 to 19-VII-58 (AOS), 1-VIII-58 (JSG); Crest W of Tioga Pass 9-VIIto 31-VII-58, 14-VIIto 2-VIII-60 and 25-VI-61 (AOS); Helen Lake 18-VII-58 (AOS); Dana, N slope 31-VII to 24-VIII-58 and 6 to 8-VIII-60 (AOS); Bert Lake 9-VIII-58 (AOS). East above Saddlebag Lake 28-VII-58 (AOS).

20. Melitaea (Chlosyne) acastus Edw. Mono Lake 5-VII-38 and 30-VI-50 (JWT), 30-VI-41 (JSG), 30-VI-58 (AOS).

21a. Melitaea (Chlosyne) palla palla Bdv. Eagle Peak 1-VII-33 (JSG); Ledge, Glacier 9-VII-33 (JSG); Reserve 16-VII-33 (JSG); Yosemite Creek 7 to 17-VII-56 (JSG); White Wolf 10-VII-56 (JSG); Indian Flat 30-V-59, 27-V-60 and 13-V-61 (JWT); El Portal 14-V-61 (JWT); Jerseydale 21-VI-61 (AOS).

22. Melitaea (Chlosyne) hoffmanni Behr Reserve 14 to 18-VII-33 (JSG); Pate 23-VII-34 (EDG); Benson 24-VII-34 (EDG); White Wolf 10-VII-56 (JSG).

23. Melitaea (Chlosyne) leanira F. & F. Ledge 9-VII-33 (JSG); Tamarack Flat 3-VIII-54 (JWT); Darrah 30-V-57 (JWT); Indian Flat 30-V-59 and 13-V to 10-VI-61 (JWT); El Portal 14-V-61 (JWT); Jerseydale 22-VI-61 (AOS).

24a. Phyciodes (Phyciodes) campestris campestris (Behr) Museum 5-VII-33 (JSG); Mather 12-VII-56 (JSG), 10-VI-61 and 30-VI-62 (JWT); Hetch-Hetchy 13-VII-56 (JSG); Jerseydale 23-VI-61 (AOS).

b. Phyciodes (Phyciodes) campestris montana (Behr) Reserve 16-VII-33 (JSG); Dana 8-VIII-33 (JSG); Coldwater 3-VIII-34 (EDG); Tamarack Flat 3-VII-54 (JWT); Aspen Valley 14-VII-56 (JSG); below Helen Lake 19-VII-60 (AOS). Thousand Island Lake 4-VIII-59 (AOS).

c. Phyciodes (Phyciodes) campestris,intermediate form Mono Lake 30-VI-41 and 19-VI-54 (JSG), 17-VII-57 and 23-VI-62 (JWT), 30-VI to 20-VII-58, 13-VII-60, 26 to 27-VI-61 and 12-VI-62 (AOS); Huntoon Public Camp, Bridgeport 19-VI-54 (JSG); June Lake 14 to 29-VIII-57 (JSG); Warren Creek 21 and 28-VII-58 (AOS); W of Lee Vining 26 to 27-VI-61 (AOS).

25. Phyciodes (Phyciodes) mylitta (Edw.) Museum 5-VII-33 (JSG); Benson 24-VII-34 (EDG); Yosemite Creek 9-VII-56 (JSG); Aspen Valley 14-VII-56 (JSG); Crane Flat 18-VIII-57 (JWT), 24-VI-59 (JSG); Tioga Pass 1-IX-57 (AOS); Tenaya 11-VII-58 (AOS); Glacier Point 23-VI-59 (JSG); Jerseydale 26-VI-59 (JSG), 30-VIII-60 (AOS); El Portal 21-III-61 (KT),

14-V-61 (JWT); Yosemite Valley 19-IV-61 (KT); Indian Flat 13-V-61 (JWT); Mather 10-VI-61 (JWT); Warren Creek 11-VIII-60 (AOS).

26. Polygonia satyrus (Edw.) Museum 5-VII-33 (JSG). Mono Lake 20-VI to25-VIII-58 and 27-VI-61 (AOS).
27. Polygonia faunus rusticus (Edw.) "Yosemite" VI-26 (E. O. Essig). Specimen in Yosemite Museum in 1933.
28. Polygonia zephyrus (Edw.) Reserve 14-VII-33 (JSG); Yosemite Creek 9-VII-56 (JSG); Aspen Valley 14-VII-56 (JSG); Jerseydale 17-VII-56 and 16-VI-58 (AOS); Dana, W slope 20-VII-58 (JWT); Tioga Pass 20-VIII-58 (AOS); Upper Gaylor Lake 20-VIII-58 (AOS); Dana, N slope 31-VII to 24-VIII-58 and 8-VIII-60 (AOS); Badger Pass 23-VI-59 (JSG); Tuolumne Grove 24-VI-59 (JSG). Mono Lake 30-VI-41 (JSG).
29. Nymphalis californica (Bdv.) Yosemite Valley 24-VI to 5-VII-33 (JSG); Ledge 9-VII-33 (JSG); Darrah, Jerseydale, and Indian Flat 30-V-59 (JWT); Bridal Veil Creek 23-VI-59 (JSG); White Wolf 24-VI-59 (JSG); Cliff House 9-VI-61 (JWT); Crane Flat, Gin Flat, and Mather 10-VI-61 (JWT) (outbreak numbers); El Portal 10-VI-61 (JWT); Jerseydale and Cathay 11-VI-61 (JWT). Donohue Pass 4-VIII-59 (AOS).
30. Nymphalis milberti furcillata (Say) Lyell 6-VIII-33 (JSG); Tioga Pass 8-VIIto 6-VIII-57, 1-VIII-58, and 25-VI-61 (AOS); Crest W of Tioga Pass 1 to 19-VIII-58 (AOS); Lyell Base Camp 9-VIII-58 (AOS); Dana, N slope 24-VIII-58 (AOS). Mono Lake 30-VI-41 (JSG), 26-VI-61 (AOS); Warren Creek 29-VIII-57 (AOS); Agnew Meadows 9-VIII-58 (AOS).
31. Nymphalis antiopa (Linn.) Research Reserve 8-VII-56 (JSG, seen). Mono Lake 30-VI-41 (JSG, seen).
32. Vanessa atalanta (Linn.) "Yosemite" VI-26 (E. O. Essig).
33. Vanessa virginiensis (Dru.) Research Reserve 14 to 18-VII-33 and 10-VII-56 (JSG); Yosemite Creek Trail 9-VII-56 (JSG); Mather 10-VI-61 (JWT).
34. Vanessa cardui (Linn.) Research Reserve 14 to 18-VII-33 (JSG); Yosemite Creek Trail 9-VII-56 (JSG).
35. Vanessa carye (Hbn.) Research Reserve 14 to 18-VII-33 (JSG); Hetch-Hetchy 12-VII-56 (JSG). Huntoon Public Camp, Bridgeport 19-VI-54 (JSG).
36. Precis orithya evarete (Cram.) Ledge Trail 9-VII-33 (JSG); Research Reserve 14 to 19-VII-33 and 8 to 10-VII-56 (JSG); Yosemite Creek Trail 9-VII-56 (JSG); Mather 11 and 12-VII-56 (JSG), 10-VI-61 (JWT); Jerseydale 17-VI-60 (AOS); El Portal 4-IV-61 (KT); Indian Flat 13-V-61 (JWT); Cathay 11-VI-61 (JWT). Mono Lake 13-VII-60 (AOS).
37. Limenitis (Limenitis) weidemeyerii nevadae (B. & B.) Mono Lake 30-VI-41 (JSG), 30-VI-50 (JWT), 30-VI to 20 -VII-58 and 26-VI-61 (AOS). Limenitis (L.) weidemeyerii nevadae X Limenitis (L.) lorquini (Hybrid) Mono Lake 17-VIII-51 (JWT), 19-VI-54 (JSG), 7 to 20-VII-58, 25-VII-59 and 27-VI-61 (AOS).
38. Limenitis (Limenitis) lorquini Bdv. Yosemite Valley VII-33 (JSG); Pate Valley 23-VII-34 (EDG); Aspen Valley 14-VII-56 (JSG); Jerseydale 16-VI-58 (AOS); Darrah and Jerseydale 30-V-59 (JWT, seen); Indian Flat 30-V-59 (seen) and 13-V-61 (JWT); Cliff House 9-VI-61 (JWT); Mather 10-VI-61 (JWT). Mono Lake 30-VI-58 (AOS).
39. Limenitis (Adelpha) bredowii californica (Butl.) Museum 5-VII-33 (JSG); Camp 9, Meadow 23-VII-33 (JSG); Mather 12 to 15-VII-56 (JSG),

10-VI-61 (JWT); Hetch-Hetchy 13 to 15-VII-56 (JSG); Aspen Valley 14-VII-56 (JSG); Crane Flat 24-VI-59 (JSG); Jerseydale 26-VI-59 (JSG), 11-VI-61 (JWT), 9 to 13-VI-62 (AOS); Darrah, Jerseydale, and Indian Flat 30-V-59 (JWT); El Portal 14-V-61 (JWT); Cliff House 9-VI-61 (JWT).

RIODINIDAE

40a. *Apodemia mormo mormo* F. & F. Little Yosemite 3-VIII-33 (JSG). Mono Lake 22 to 26-VIII-57 and 20-VII-58 (AOS); June Lake 22-VIII-57 (JSG); Conway Pass, N of Mono Lake 21-VIII-60 (JWT).

b. *Apodemia mormo tuolumnensis* Opler & Powell Pate Valley 23-VII-34 (EDG, as *A. m. virgulti*).

LYCAENIDAE

41. *Habrodais grunus* (Bdv.) Columbia Point 14-VII-33 (JSG); Pohono Trail 23-VII-33 (JSG); Benson 24-VII-34 (EDG); Hetch-Hetchy 13-VII-56 (JSG); Jerseydale 21 to 23-VI-61 (AOS).
42. *Atlides halesus estesi* Clench Museum 5-VIII-34 (collector unknown); Yosemite Creek Trail 9-VII-56 (JSG).
43. *Strymon (Strymon) melinus pudica* (Hy. Edw.) Museum 8-VII-33 (JSG); Mather 12-VII-56 (JSG); Darrah 29-V-59 (JWT).
44. *Strymon (Satyrium) fuliginosum semiluna* (Klots) Mono Lake 30-VI-50 (JWT), 30-VI-58 (AOS).
45. *Strymon (Satyrium) behrii* (Edw.) Mono Lake 30-VI-50 and 23-VI-62 (JWT), 30-VI to 20-VII-58 and 27-VI-61 (AOS); W of Lee Vining 18-VII-57 and 24-VI-58 (AOS); Bodie 18-VII-57 (AOS); Mono Craters 23-VII-57 (AOS); Warren Creek 26-VI-61 (AOS). 5 miles N of Mono Lake 28-VI-61 (AOS).
46. *Strymon (Satyrium) auretorum* (Bdv.) El Portal 28-VI-33 (JSG), 10-VI-61 (JWT); Briceburg and Mariposa 26-VI-54 (JWT); Hetch-Hetchy Road 13 to 15-VII-56 (JSG); Jerseydale 21 and 22-VI-58 (AOS); Darrah 29-V-59 (JWT); Cathay 11-VI-61 (JWT).
47. *Strymon (Satyrium) saepium* (Bdv.) El Portal 28-VI-33 (JSG); Pate 23-VII-34 (EDG); Hetch-Hetchy Road 13-VII-56 (JSG); Gin Flat 17-VIII-57 (JWT); Jerseydale 21 and 22-VI-58 (AOS); Darrah and Indian Flat 30-V-59 (JWT); Cathay 28-V-60 and 11-VI-61 (JWT); Cliff House 9-VI-61 (JWT), Warren Creek 28-VII and 28-VIII-58 (AOS); Gull Lake 2-IX-61 (JWT).
48. *Strymon (Satyrium) adenostomatis* (Hy. Edw.) Mariposa 26-VI-54 (JWT); Jerseydale 21 and 22-VI-58 (AOS); Darrah 29-V-59 (JWT).
49. *Strymon (Satyrium) sylvinus* (Bdv.) Museum 8-VII-33 (JSG); Bear Creek Lodge 26-VI-54 (JWT); Hetch-Hetchy Road 13-VII-56 (JSG); Jerseydale 21-VI-61 (AOS). Mono Lake 5-VII-38 (JWT).
50. *Strymon (Satyrium) californica* (Edw.) Old Village 12-VI-32 (JWT); Museum 5-VII-33 (JSG); Pate 23-VII-34 (EDG); Big Oak Flat Road 2-VII-54 (JWT); Mirror Lake 2-VII-54 (JWT); Tamarack Flat 4-VII-54 (JWT); Hetch-Hetchy Road 13 to 15-VII-56 (JSG); Mather 15-VII-56 (JSG); Jerseydale 15 to 22-VI-58, 17-VI-60 and 21 to 23-VI-61 (AOS); Darrah 30-V-59 (JWT); El Portal 14-V and 10-VI-61 (JWT); Cathay 11-VI-61 (JWT). Mono Lake 5-VII-38, 30-VI-50, 17-VII-57, and 23-VI-62 (JWT), 30-VI-58 and 27-VI-61 (AOS); Lee Vining 24-VI-58 (AOS); Warren Creek 21-VII-58 (AOS); 5 miles N of Mono

Lake 28-VI-61 (AOS).

51. *Strymon (Satyrium) dryope* (Edw.) Mono Lake 20-VII-58 and 4-VIII-60 (AOS); Bridgeport 15-VIII-52 (JWT).

52. *Callophrys (Callophrys) dumetorum* (Bdv.) Briceburg 21-III-61 (KT); El Portal 16-IV-61 (JWT); Mather 14-V-61 (JWT).

53. *Callophrys (Callophrys) lemberti* Tilden Reserve 16-VII-33 (JSG); Pilot Peak 19-VII and 16-VIII-52 (JWT); White Wolf 10-VII-56 (JSG); Crest W of Tioga Pass 9-VII-58 and 25-VI-61 (AOS), 20-VII-58 (JWT); Tioga Pass 10-VII-58 (AOS). Warren Creek 12-VI-62 (AOS).

54. *Callophrys (Mitoura) spinetorum* (Hew.) Tamarack Flat 4-VII-54 (JWT); Jerseydale 18-VI-57 and 27-VIIto 3-VIII-62 (AOS); Tioga Road 24-VI-59 (JSG).

55. *Callophrys (Mitoura) johnsoni* (Skin.) Jerseydale 27 and 28-VII-56, 9-VIII-56 and 27-VII-62 (AOS).

56. *Callophrys (Mitoura) nelsoni* (Bdv.) Museum 5-VII-33 (JSG); Reserve 14 to 18-VII-33 (JSG); Hetch-Hetchy 13-VII-56 (JSG); Jerseydale 30-V-59, 27-V-60, and 11-VI-61 (JWT), 26-VI-59 (JSG), 9 to 13-VI-62 (AOS); Crane Flat 24-VI-59 (JSG); Highway 120 and Hetch-Hetchy Road 14-V-61 (JWT); Cliff House 9-VI-61 (JWT); Mather 10-VI-61 (JWT).

57. *Callophrys (Incisalia) doudoroffi windi* (Clench) Indian Flat 16-IV-61 (JWT).

58. *Callophrys (Incisalia) iroides* (Bdv.) Ledge 9-VII-33 (JSG); Crane Flat 3-VII-54 (JWT); Jerseydale 19-VI-58 and 21 to 23-VI-61 (AOS), 29-V-59 (JWT); Darrah 29-V-59 (JWT); Glacier Point 23-VI-59 (JSG); El Portal 4-IV-61 (KT); Mather 10-VI-61 (JWT).

59. *Callophrys(Incisalia)eryphon* (Bdv.) Reserve 9 to 14-VII-33 (JSG); Tamarack Flat 4-VII-54 (JWT); Smoky Jack 4-VII-54 (JWT); Mather 12-VII-56 (JSG), 10-VI-61 (JWT); Jerseydale 16-VI-58 (AOS), 29-V-59 (JWT); Tenaya Canyon 11-VII-58 (AOS). Mono Lake 27-VI-61 (AOS).

60a. *Lycaena (Tharsalea) arota arota* (Bdv.) Museum 8-VII-33 (JSG); Pate 23-VII-34 (EDG); Jerseydale 29-VI to 27-VII-56, 1-VIII-58, 24-VIII-60, 23-VI-61 and 28-VII-62 (AOS).

b. *Lycaena (Tharsalea) arota virginiensis* (Edw.) Mono Lake 17-VII-57 (JWT), 26-VIII-57, 7 to 20-VII-58 and 13-VII-60 (AOS).

61. *Lycaena (Lycaena) gorgon* (Bdv.) Darrah 29-V-59 (JWT); Indian Flat 30-V-59 and 13-V to 10-VI-61 (JWT); El Portal 14-V-61 (JWT).

62. *Lycaena (Lycaena) heteronea* Bdv. Lyell Base Camp 26-VII-57 (AOS); Tioga Pass 4-VIII-57 (AOS); Merced Lake Trail 4-VIII-58 (AOS); Gaylor Lakes Trail 3-IX-58 (JWT); Dana, N slope 8-VIII-60 (AOS). Warren Creek 7-VIII-57 and 21-VII to 28-VIII-58 (AOS); Lundy 20-VII-58 (AOS); Mono Lake 13-VII-60 (AOS). Thousand Island Lake 4-VIII-59 (AOS).

63. *Lycaena (Lycaena) xanthoides* (Bdv.) Mather 11 and 12-VII-56 (JSG), 30-VI-62 (JWT); Hetch-Hetchy 13-VII-56 (JSG); Aspen Valley 14-VII-56 (JSG).

64. *Lycaena (Lycaena) rubidus* (Behr) Mono Lake 27-VII-37 (JWT), 30-VI-41 (JSG), 30-VI to 7-VII-58 and 27-VI-61 (AOS); Gaylor Lakes Trail 16-VIII-52 (JWT); Warren Creek 7 to 29-VIII-57, 21-VII to 28-VIII-58 and 11-VIII-60 (AOS); Agnew Pass 5-VIII-59 (AOS); W of Lee Vining 28-VI-61 (AOS).

65. *Lycaena* (*Lycaena*) *editha* (Mead) Kuna 7-VIII-33 (JSG); Dana 8-VIII-33 (JSG); Kerrick 27-VII-34 (EDG); Snow Lake 29-VII-34 (EDG); Tamarack Flat 4-VII-54 (JWT); Tioga Pass 16 to 17-VII-57 (JWT), 14-VII to 24-VIII-58 and 14-VIII-60 (AOS); Gin Flat and Crane Flat 19-VII-57 (JWT); Rafferty Creek 21-VII-57 (AOS); Tioga Meadow 15-VIII-57 (JWT); Pilot Peak 15-VIII-57 and 31-VIII-58 (JWT); Dana, W slope 17-VIII-57 and 20-VIII-58 (JWT); Tuolumne Meadows 15 to 21-VIII-58 (AOS), 3-IX-58 (JWT); Gaylor Lakes Trail 30-VIII to 3-IX-58 (JWT); Lyell Base Camp 3-VIII-59 (AOS); below Agnew Pass 5-VIII-59 (AOS). Mono Lake 30-VI-41 (JSG); Bodie 18-VII-57 (AOS); Warren Creek 21-VII-58 (AOS).
66. *Lycaena* (*Lycaena*) *mariposa* Reak. Kuna 7-VIII-33 (JSG); Slide 29-VII-34 (EDG); Dana, W slope 13-VIII-50, 15-VIII-51, 16-VIII-57 and 30-VIII-58 (JWT); Lyell Base Camp Trail 26-VII-57 and 10-VIII-58 (AOS); Tioga Pass 4-VIII-57, 20-VIII-58 and 1-VIII-59 (AOS); Pilot Peak 15-VIII-57 (JWT); Elizabeth Lake 27-VII to 22-VIII-58 and 27-VII-59 (AOS); Merced Lake Trail 4-VIII-58 (AOS). Agnew Meadow 13-VIII-57 (AOS).
67. *Lycaena* (*Lycaena*) *nivalis* (Bdv.) Tioga Pass 14-VII-31 (JWT), 20-VIII-58 (AOS); Glacier 9-VII-33 (JSG); Reserve 14-VII-33 (JSG); Kuna 7-VIII-33 (JSG); Benson 24-VII-34 (EDG); Kerrick 27-VII-34 (EDG); Gaylor Lakes Trail 15-VIII-51, 6-VIII-53 and 19-VII to 3-IX-58 (JWT); Smoky Jack 3-VII-54 (JWT); Yosemite Creek Trail 9-VII-56 (JSG); Dog Lake Trail 19-VII-56 (JSG); Rafferty Creek Trail 21-VII-57 and 24-VII-58 (AOS); 3-VIII-58 (JSG); Tenaya Canyon 11-VII-58 (AOS); Crest W of Tioga Pass 4 to 18-VIII-57, 20-VIII-58 and 20 to 23-VII-60 (AOS); Lyell Fork Meadows 10-VIII-58 and 3-VIII-59 (AOS); Dana, N slope 24-VIII-58 (AOS). Warren Creek 21-VII-58 (AOS).
68. *Lycaena* (*Lycaena*) *helloides* (Bdv.) El Portal 28-VI-33 (JSG); Mather 12-VII-56 (JSG). Mono Lake 5-VII-38 (JWT).
69. *Lycaena* (*Lycaena*) *phlaeas hypophlaeas* (Bdv.) Lyell 6-VIII-33 (JSG); Dana, N slope 6 to 13-VIII-60 (AOS).
70. *Lycaena* (*Lycaena*) *cupreus* (Edw.) Tioga Pass 7-VII-31, 13-VIII-50, 15-VIII-51, 16-VII to 16-VIII-52, 6-VIII-53, and 18-VII to 16-VIII-57 (JWT), 7 to 15-VII-57, 9-VII to 24-VIII-58, 15-VII-60 and 25-VI-61 (AOS); Kuna 7-VIII-33 (JSG); Dana 8-VIII-33 (JSG); Snow Lake 29-VII-34 (EDG); Dog Lake Trail 19-VII-56 (JSG); Pilot Peak 18-VII to 15-VIII-57 (JWT); Cockscomb Peak 26-VI-58 (AOS); Tuolumne Meadows 4-VII-58 (AOS); Crest W of Tioga Pass 9-VII to 1-VIII-58 (AOS); Helen Lake 18 to 29-VII-58 (AOS); Elizabeth Lake 27-VII-58 (AOS); Upper Gaylor Lake 1-VIII-58 (JSG); Rafferty Creek Trail 3-VIII-58 (AOS).
71. *Leptotes marina* (Reak.) Mono Lake 30-VI-41 (JSG), 30-VI-50 (JWT, seen) and 23-VI-62 (JWT).
72. *Brephidium exilis* (Bdv.) E above Saddlebag Lake 28-VII-58 (AOS); Mono Lake 23-VI-62 (JWT).
73. *Hemiargus* (*Echinargus*) *isolus* (Reak.) Tioga Pass 9-VII to 7-VIII-58 (AOS); Crest W of Tioga Pass 9-VII-58 (AOS); Upper Gaylor Lake 14-VII-58 (AOS); Rafferty Creek Trail 3-VIII-58 (JSG, AOS); Vogelsang Lake 3-VIII-58 (JSG, AOS); Gaylor Lakes Trail 31-VIII to 3-IX-58 (JWT); Tuolumne Meadows 3-IX-58 (JWT). Mono Lake 20-VII-58 (AOS); Lee Vining 24-VII-58 (AOS); Warren Creek 28-VII-

58 (AOS).

74. *Lycaeides argyrognomon anna* (Edw.) Conness Creek 11-VII-31 (JWT); Dana 8-VIII-33 (JSG); Kerrick 27-VII-34 (EDG); Coldwater 3-VIII-34 (EDG); Tenaya 4-VIII-34 (EDG); Crane Flat 2-VII-54 and 19-VII-57 (JWT); Hetch-Hetchy Summit 13-VII-56 (JSG); Aspen Valley 14-VII-56 (JSG); Gin Flat 19-VII-57 (JWT); Tuolumne Meadows 14-VIII-57 (JWT); Badger Pass 23-VI-59 (JSG).

75. *Lycaeides melissa inyoensis* Nab. Reserve 16-VII-33 (JSG); Benson 24-VII-34 (EDG); Helen Lake 18-VII-58 (AOS); Cockscomb Peak 26-VII-58 (AOS); Upper Lyell Base Camp 10-VIII-58 and 3-VIII-59 (AOS). Mono Lake 20-VII-58 (AOS), 23-VI-62 (JWT); E above Saddlebag Lake 28-VII-58 (AOS); Warren Creek 11-VIII-60 and 26-VI-61 (AOS); Conway Summit 23-VI-62 (JWT).

76. *Plebejus (Agriades) glandon podarce* (F. & F.) Tioga Pass 7-VII-31, 13 and 14-VIII-50, 15-VIII-51, 16-VIII-52, 6 and 7-VIII-53, and 16-VIII-57 (JWT), 1 to 24-VIII-58 and 23-VII-60 (AOS); Eagle Peak 1-VII-33 (JSG); Reserve 18-VII-33 and 10-VII-56 (JSG); Kuna 7-VIII-33 (JSG); Kerrick 27-VII-34 (EDG); Tuolumne Meadows 16-VII-57 (JWT); Dana, W slope 17-VIII-57 and 30-VIII-58 (JWT); Elizabeth Lake 27-VII-58 (AOS); Helen Lake 29-VII-58 (AOS); Upper Gaylor Lake 1-VIII-58 (JSG); Bert Lake 9-VIII-58 (AOS); Unicorn Peak 23-VIII-58 (AOS); Bridal Veil 23-VI-59 (JSG); White Wolf 24-VI-59 (JSG); Dana, N slope 8-VIII-60 (AOS).

77. *Plebejus (Plebejus) saepiolus* (Bdv.) Glacier 9-VII-33 (JSG); Reserve 17-VII-33 (JSG); Florence 5-VIII-33 (JSG); Pate 23-VII-34 (EDG); Tioga Pass 15-VIII-51, 6-VIII-53 and 16 to 18-VIII-57 (JWT), 9-VII to 24-VIII-58 and 13 to 15-VII-60 (AOS); Crane Flat 3-VII-54 and 19-VII-57 (JWT); Hetch-Hetchy Summit 13-VII-56 (JSG); Aspen Valley 14-VII-56 (JSG); Tuolumne Meadows 18-VII-57 (JWT); Gin Flat 19-VII-57 (JWT); Dana, W slope 17-VIII-57 and 20-VII to 30-VIII-58 (JWT); Crest W of Tioga Pass 9-VII to 20-VIII-58 (AOS); Helen Lake 18-VII-58 and 19-VII-60 (AOS); Rafferty Creek Trail 3-VIII-58 (JSG, AOS); Gaylor Lakes Trail 31-VIII to 3-IX-58 (JWT); Bridal Veil and Badger Pass 23-VI-59 (JSG); White Wolf, Tioga Road, and Crane Flat 24-VI-59 (JSG). Mono Lake 5-VII-38, 30-VI-50 and 14-VIII-57 (JWT), 30-VI-41 (JSG), 13-VII-60 (AOS).

78a. *Plebejus (Icaricia) icarioides icarioides* (Bdv.) Glacier 9-VII-33 (JSG); Aspen Valley 14-VII-56 (JSG); below Vogelsang Pass 3-VIII-58 (AOS); Badger Pass 23-VI-59 (JSG); Crane Flat 24-VI-59 (JSG); Jerseydale 29 to 30-V-59 and 11-VI-61 (JWT), 26-VI-59 (JSG), 9 to 13-VI-62 (AOS); Indian Flat 13-V-61 to 10-VI-61 (JWT); Mather 10-VI-61 and 30-VI-62 (JWT).

b. *Plebejus (Icaricia) icarioides helios* Edw. Mono Lake 4-VII-38 and 23-VI-62 (JWT), 30-VI-41 and 19-VI-54 (JSG), 7 to 20-VII-58 and 26 to 27-VI-61 (AOS); Conway Pass, N of Mono Lake 30-VI-50 and 23-VI-52 (JWT); Huntoon Public Camp, Bridgeport 19-VI-54 (JSG); Bodie 28-VII-57 (AOS); Agnew Pass and Donohue Pass 4-VIII-59 (AOS); Warren Creek 11-VIII-60 (AOS); W of Lee Vining 26-VI-61 (AOS); 5 mi N of Mono Lake 28-VI-61 (AOS).

79. *Plebejus (Icaricia) shasta comstocki* Fox Reserve 16-VII-33 (JSG); Kuna 7-VII-33 (JSG); Kerrick 27-VII-34 (EDG); Slide Creek 29-VII-34 (EDG); Tioga Pass 13-VIII-50, 15-VIII-52, 5 to 6-VIII-53, and 16-VIII-57 (JWT), 15-VII-57, 14-VII to 20-VIII-58 and 15 to 20-VII-

60 (AOS); Pilot Peak 15-VII-57 and 19-VII to 31-VIII-58 (JWT); Gin Flat 17-VIII-57 (JWT); Dana, W slope 17-VIII-57 and 30-VIII-58 (JWT); Upper Gaylor Lake 14 to 19-VII-58 (AOS); Helen Lake 18-VII-58 (AOS); Upper Lyell Base Camp 9-VIII-58 (AOS); Crest W of Tioga Pass 19 to 20-VIII-58 (AOS); Dana, N slope 24-VIII-58 and 8-VIII-60 (AOS); Gaylor Lakes Trail 3-IX-58 (JWT). Bodie 18-VII-57 (AOS); Lundy 20-VII-58 (AOS); Donohue Pass 4 to 6-VIII-59 (AOS); Warren Creek 11-VIII-60 (AOS).

80. *Plebejus (Icaricia) acmon* (West. & Hew.) Reserve 14-VII-33 (JSG); Pohono 25-VII-33 (JSG); Kerrick 27-VII-34 (EDG); Coldwater 3-VIII-34 (EDG); Smoky Jack 4-VII-54 (JWT); Mather 11 to 13-VII-56 (JSG); Hetch-Hetchy Summit 13-VII-56 (JSG); Gin Flat 17-VIII-57 (JWT); Tenaya Canyon 11-VII-58 (AOS); Tuolumne Meadows 3-IX-58 (JWT); Jerseydale 30-V-59, 27-V-60 and 11-VI-61 (JWT), 26-VI-59 (JSG); Indian Flat 30-V-59, 27-V-60 and 14-V to 10-VI-61 (JWT); Briceburg 21-III-61 (KT); El Portal 21-III-61 (KT), 14-V-61 (JWT); Cliff House 9-VI-61 (JWT); Mather 10-VI-61 (JWT); Cathay 11-VI-61 (JWT). Mono Lake 30-VI-41 (JSG), 30-VI to 7-VII-58 and 12-VI-62 (AOS); Huntoon Public Camp, Bridgeport 19-VI-54 (JSG); Warren Creek 11-VIII-60 and 26-VI-61 (AOS).

81. *Plebejus (Icaricia) lupini* (Bdv.) Eagle Peak 1-VII-33 (JSG); Dana, W slope 16-VIII-52, 6-VIII-53 and 20-VII-58 (JWT); Smoky Jack 3 to 4-VII-54 (JWT); Crest W of Tioga Pass 12-VII-57, 4-VII to 19-VIII-58, 15 to 23-VII-60 and 25-VI-61 (AOS); Upper Gaylor Lake 14 to 19-VII-58 (AOS); Helen Lake 18-VII-58 (AOS); Dana, N slope 24-VIII-58 (AOS). Lee Vining 3 to 5-VII-38 (JWT); E above Saddlebag Lake 28-VII-58 (AOS); Below Conway Summit 23-VI-62 (JWT).

82. *Everes comyntas* (Godt.) Mono Lake 5-VII-38, 30-VI-50 and 23-VI-62 (JWT), 26-VI-61 and 12-VI-62 (AOS); E above Saddlebag Lake 28-VII-58 (AOS).

83. *Everes amyntula* Bdv. Hetch-Hetchy Summit 13-VII-56 (JSG, seen); Jerseydale 30-V-59 (JWT).

84. *Philotes enoptes* (Bdv.) Yosemite Valley 17-VI-32 (JWT); Ledge 9-VII-33 (JSG); Reserve 16-VII-33 and 7-VII-56 (JSG); Tioga Pass 16-VII-52 (JWT), 12-VII-57, 9-VII to 14-VIII-58 and 14 to 23-VII-60 (AOS); Smoky Jack 4-VII-54 (JWT); Big Oak Flat Road 5-VII-54 (JWT); Tenaya Canyon 11-VII-58 (AOS). E above Saddlebag Lake 28-VII-58 (AOS).

85a. *Philotes battoides battoides* (Behr) Reserve 15 to 16-VII-33 and 7-VII-56 (JSG); Slide Creek 29-VII-34 (EDG); Gaylor Lakes Trail 16-VIII-52, 6-VIII-53 and 3-IX-58 (JWT); Mt. Hoffman 14-VII-57 (AOS); Pilot Peak 18-VII-57 and 31-VIII-58 (JWT); Crest W of Tioga Pass 19-VII to 1-VIII-58, 14 to 15-VII-60, 25-VI-61 and 8-VIII-62 (AOS); Helen Lake 18 to 29-VII-58 (AOS); Cockscomb Peak 26-VII-58 (AOS); Vogelsang 23-VII-58 (JWT); Vogelsang Pass 3-VIII-58 (AOS).

b. *Philotes battoides glaucon* (Bdv.) Mono Lake 5-VII-38 and 23-VI-62 (JWT), 30-VI-41 (JSG), 30-VI-58 and 26 to 27-VI-61 (AOS); Warren Creek 21-VII-58 (AOS); Conway Summit 23-VI-62 (JWT).

86. *Philotes speciosa* (Hy. Edw.) Mariposa 30-V-32 (G. & R. Bohart); Briceburg 3-VI-38 (R. M. Bohart).

87. *Phaedrotes piasus* (Bdv.) Eagle Peak 1-VII-33 (JSG); Reserve 9 to 14-VII-34 (EDG ?); Jerseydale 9 to 13-VI-62 (AOS); Mather 30-VI-62 (JWT). Mono Lake 30-VI-41 (JSG).

88a. Glaucopsyche lygdamus behrii(Edw.) Indian Flat 16 to 17-IV-61 (JWT); El Portal 17-IV-61 (JWT).

b. Glaucopsyche lygdamus columbia (Skin.) Eagle Peak 1-VII-33 (JSG); Reserve 9 to 14-VII-34 (EDG?); Tioga Pass 16-VIII-52 (JWT); Crane Flat and Tamarack Flat 3-VII-54 (JWT); White Wolf 10-VII-56 (JSG); Tenaya Canyon 11-VII-58 (AOS); Upper Gaylor Lake 19-VII-58 (JWT); Dana, W slope 20-VII-58 (JWT); Below Vogelsang Pass 3-VIII-58 (AOS); Badger Pass 23-VI-59 (JSG). E above Saddlebag Lake 28-VII-58 (AOS).

89. Celastrina argiolus echo (Edw.) El Portal 28-VI-33 (JSG); Glacier 9-VII-33 (JSG); Reserve 14 to 18-VII-33 and 7-VII-56 (JSG); Crane Flat 3-VII-54 (JWT); Mather 12-VII-56 (JSG), 14-V-61 (JWT); Aspen Valley 14-VII-56 (JSG); Darrah, Jerseydale, and Indian Flat 29 to 30-V-59 and 10-VI-61 (JWT); Badger Pass and Bridal Veil 23-VI-59 (JSG); Tamarack 24-VI-59 (JSG); Briceburg and El Portal 21-III-61 (KT).

PIERIDAE

90a. Anthocharis (Anthocharis) sara sara Luc. Indian Flat 13-V-61 (JWT); El Portal 14-V-61 (JWT).

Anthocharis (Anthocharis) sara reakirtii Edw., gen. vern. Briceburg 21-III-61 (KT), 16-VI-61 (JWT); El Portal 21-III and 4-IV-61 (KT), 14-IV-62 (JWT); Indian Flat 17-IV-61 (JWT).

b. Anthocharis (Anthocharis) sara stella Edw. Eagle Peak 1-VII-33 (JSG); Reserve 16 to 17-VII-33 (JSG); White Wolf 10-VII-56 (JSG).

91. Anthocharis (Falcapica) lanceolata Luc. Eagle Peak 1-VII-33 (JSG); Ledge 9-VII-33 (JSG); Yosemite Valley 14-V-59 (R. Paul Allen); Jerseydale 9 to 13-VI-62 (AOS).

92. Euchloe creusa hyantis (Edw.) Eagle Peak 1-VII-33 (JSG); Glacier 9-VII-33 (JSG); Reserve 16-VII-33 (JSG); Ostrander 4-VII-34 (EDG); El Portal 16-IV and 14-V-61, and 14-IV-62 (JWT, common); Indian Flat 17-IV-61 (JWT); Mather 14-V-61 (JWT).

93. Euchloe ausonides coloradensis (Hy. Edw.) Reserve 16 and 17-VII-33 (JSG); Tamarack Flat 3-VII-54 (JWT). Mono Lake 30-VI-58 (AOS).

94. Colias eurytheme Bdv. Ledge 9-VII-33 (JSG); Reserve 16-VII-33 and 7 to 11-VII-56 (JSG); Camp 9, Yosemite Valley 23-VII-33 (JSG); Crane Flat 3-VII-54, 18-VIII-57, and 10-VI-61 (JWT); Mather 11 to 12-VII-56 (JSG), 14-V and 10-VI-61 (JWT); Hetch-Hetchy 13-VII-56 (JSG); Aspen Valley 14-VII-56 (JSG); Gaylor Lakes Trail 19-VII-58 (JWT); Dana, W slope 30-VIII-58 (JWT); Briceburg 21-III-61 (KT); El Portal 21-III-61 (KT), 14-V-61 (JWT); Yosemite Valley 19-IV-61 (KT); Indian Flat 13-V-61 (JWT); Jerseydale 11-VI-61 (JWT).

95. Colias philodice hagenii Edw. Mono Lake 30-VI-41 (JSG); 18-VII-57 and 30-VI-58 (AOS).

96. Colias occidentalis chrysomelas Hy. Edw. "Yosemite" VI-26 (E. O. Essig).

97. Colias behrii Edw. Tioga Pass 13-VIII-29 and 1 to 3-VIII-56 (JSG), 14-VII-31, 13-VIII-50 and 16-VIII-57 (JWT), 4-VIII-57 and 14-VII to 19-VIII-58 (AOS); Florence 5-VIII-33 (JSG); Kuna 7-VIII-33 (JSG); Kerrick 27-VII-34 (EDG); Snow Lake 29-VII-34 (EDG); Tuolumne

Meadows 15-VIII-57 (JWT); Pilot Peak 15 to 18-VIII-57 (JWT); Upper Gaylor Lake 19-VII to 20-VIII-58 (AOS); Helen Lake 29-VII-58 (AOS); Crest W of Tioga Pass 31-VII-58 (AOS); Rafferty Creek Trail 3-VIII-58 (AOS, JSG); Merced Lake Trail 4-VIII-58 (AOS); Lyell Base Camp 10-VIII-58 (AOS); Elizabeth Lake 23-VIII-58 (AOS). E of Donohue Pass 4 to 6-VIII-59 (AOS).

98. *Colias (Zerene) eurydice* Bdv. "Yosemite" VI-26 (E. O. Essig or P.J. Woolf).

99. *Nathalis iole* Bdv. "Yosemite" VI-26 (P. J. Woolf). Warren Creek 20, 21 and 28-VII-58 (AOS).

100. *Neophasia menapia tau* (Scud.) Big Oak Flat Road VIII-28 (JSG, seen); Little Yosemite Valley 3-VIII-33 (JSG); Pate 23-VII-34 (EDG); Buck Meadow 4-VII-54 (JWT); Unicorn Peak 27-VII-59 (AOS). Deadman's Summit 20-IX-56 (JWT); June Lake 21-VIII-57 (JSG).

101. *Pieris (Pontia) beckeri* Edw. Mono Lake 5-VII-38, 30-VI-50, 15-VIII-53 and 23-VI-62 (JWT), 26 and 27-VI-61 (AOS).

102. *Pieris (Pontia) sisymbrii* Bdv. Eagle Peak 1-VII-33 (JSG); Reserve 16-VII-33 and 7-VII-56 (JSG); Dana, W slope 19-VII-52, 16-VIII-53 and 20-VII-58 (JWT); Upper Gaylor Lake 4 to 8-VII-57, 9 to 19-VII-58 and 25-VI-61 (AOS); Crest W of Tioga Pass 9-VII-58 (AOS); Tioga Pass 10-VII-58 (AOS); Briceburg and El Portal 21-III-61 (KT); El Portal 14-IV-62 (JWT).

103. *Pieris (Pontia) protodice* Bdv. & Lec. El Portal 28-VII-33 (JSG); Yosemite Creek Trail 9 to 17-VII-56 (JSG).

104a. *Pieris (Pontia) occidentalis occidentalis* Reak. Crest W of Tioga Pass 18 to 20-VIII-57 and 19 to 20-VIII-58 (AOS).

b. *Pieris (Pontia) occidentalis calyce* Edw. Pilot Peak 18-VIII-52, 15-VIII-57, and 20-VII-58 (JWT); Crest W of Tioga Pass 8-VII-57 and 9-VII-58 (AOS); Upper Gaylor Lake 9-VII-58 (AOS), 1-VIII-58 (JSG); Vogelsang Camp 3-VIII-58 (JSG). Warren Creek 29-VIII-57 (AOS).

105. *Pieris (Pieris) napi venosa* Scud. Yosemite Valley 14-V-59 (R. P. Allen); Briceburg 21-III-61 (KT); El Portal 14-IV-61 (JWT); Jerseydale 22-VI-61 (AOS).

106. *Pieris (Pieris) rapae* (Linn.) Pate 23-VII-34 (EDG); Indian Flat 30-V-59 (JWT, seen).

PAPILIONIDAE

107. *Papilio zelicaon* Luc. Reserve 16-VII-33 (JSG); Mather 15-VII-56 (JSG); Jerseydale 16-VI-57 and 4-VIII-62 (AOS); Crest W of Tioga Pass 9-VII-58 (AOS); Upper Gaylor Lake 19-VII-58 (AOS); El Portal 4-IV-61 (KT).

108. *Papilio indra* Reak. Yosemite Valley 17-VI-32 (JWT); Reserve 18-VII-33 (A. Carthew); Crest W. of Tioga Pass 25-VI-61 (AOS). Mono Lake 23-VI-62 (JWT). Mammoth Peak 16-VII-60 (AOS).

109. *Papilio rutulus* Luc. Camp 19, Yosemite Valley 26-VI-33 (JSG); Pate 23-VII-34 (EDG); Yosemite Creek Trail 9-VII-56 (JSG); Hetch-Hetchy 13-VII-56 (JSG); Darrah, Jerseydale, and Indian Flat 29 to 30-V-59 (JWT). Mono Lake 30-VI-41 (JSG, seen), 27-VI-61 and 12-VI-62 (AOS); W of Lee Vining 27-VI-61 (AOS); Below Conway Summit 23-VI-62 (JWT).

110. *Papilio multicaudatus* Kby. Jerseydale 7-VIII-56 and 2-VIII-57 (AOS).

111a. *Papilio eurymedon eurymedon* Luc. Ledge 9-VII-33 (JSG); Pate 23-VII-34 (EDG); Mather 12-VII-56 (JSG); Hetch-Hetchy 13-VII-56 (JSG); Jerseydale 16-VI-57, 16-VI-58, 21-VI-61 and 13-VI-62 (AOS); Darrah, Jerseydale, and Indian Flat 29 to 30-V-59 (JWT).

b. *Papilio eurymedon albanus* F. & F. Research Reserve 10-VII-56 (JSG).

112. *Parnassius clodius baldur* Edw. Tioga Pass 7-VII-31 (JWT); Eagle Peak 1-VII-33 (JSG); Glacier 9-VII-33 (JSG); Dana 8-VIII-33(JSG); Slide 29-VII-34 (EDG); Gin Flat 4-VII-54 (JWT, seen); Jerseydale 23-VI-56, 21-VI-57, 16 to 18-VI-58 and 22-VI-61 (AOS); Yosemite Creek 7-VII-56 (JSG); White Wolf 10-VII-56 (JSG); Crest W of Tioga Pass 12-VII to 18-VIII-57, 28-VII to 19-VIII-58 and 4 to 20-VII-60 (AOS); Pilot Peak 18-VII-57 and 31-VIII-58 (JWT); Rafferty Creek 21-VII-57 (AOS); Tenaya Canyon 11-VII-58 (AOS); Lewis Creek Trail 3-VIII-58 (JSG); Dana, W slope 30-VIII-58 (JWT).

113. *Parnassius phoebus behrii* Edw. Reserve 14-VII-33 (JSG); Dana 8-VIII-33 (JSG); Pilot Peak 13 to 14-VIII-52, 18-VII to 15-VIII-57 and 31-VIII-58 (JWT); Upper Gaylor Lake 31-VII to 20-VIII-57 and 31-VII to 20-VIII-58 (AOS), 19-VII-58 (JWT), 1-VIII-58 (JSG); Helen Lake 18-VII-58 (AOS); Dana, W slope 20-VII-58 (JWT); Crest W of Tioga Pass 19-VIII-58 (AOS); Dana, N slope 24-VIII-58 (AOS). E of Saddlebag Lake 28-VII-58 (AOS).

114. *Epargyreus clarus* (Cram.) Coulterville Road VI-26 (D. D. MacLean); Indian Flat 30-V-59 (JWT, seen).

115. *Thorybes pylades* (Scud.) Fish Camp 18-VI-57 (JWT); Jerseydale 30-V-59 (JWT); Indian Flat 13-V-61 (JWT).

116. *Thorybes mexicana nevada* Scud. Tioga Pass 7-VII-31, 16-VIII-52 and 18-VII-57 (JWT); 8-VII-57, 26-VI to 19-VII-58, 14-VII-60 and 25-VI-61 (AOS); Reserve 16-VII-33 (JSG); Tamarack 3-VII-54 (JWT); Pilot Peak 18-VII-57 and 31-VIII-58 (JWT); Dana, W slope 17-VIII-57 and 20-VII-58 (JWT); Gaylor Lakes Trail 9-VII-58 (JWT); Crest W of Tioga Pass 9-VII-58 (AOS); Upper Gaylor Lake 14 to 19-VII-58 (AOS), 1-VIII-58 (JSG); Helen Lake 18 to 29-VII-58 (AOS); Gin Flat and Crane Flat 10-VI-61 (JWT).

117. *Thorybes diversus* Bell Aspen 14-VII-56 (JSG); Jerseydale 16-VI-57 and 16-VI-58 (AOS); Mather 10-VI-61 and 30-VI-62 (JWT).

118. *Pyrgus ruralis* (Bdv.) Reserve 15-VII-33 and 10-VII-56 (JSG); Tamarack 3-VII-54 (JWT); Tenaya 11-VII-58 (AOS, seen); Lyell Fork Meadows 7-VIII-58 (AOS).

119. *Pyrgus communis* (Grote) "Yosemite" VI-26 (P. J. Woolf); Aspen Valley 14-VII-56 (JSG); El Portal 16-IV, 14-V and 10-VI-61 (JWT); Indian Flat 15-IV, 14-V and 11-VI-61 (JWT).

120. *Heliopetes ericetorum* (Bdv.) Jerseydale 16-VI-58 (AOS); El Portal 14-V-61 (JWT, seen); Highway 120 and Hetch-Hetchy Road 14-V-61 (JWT).

121. *Erynnis persius* (Scud.) Reserve 15-VII-33 (JSG, as *afranius*); Chowchilla Mt. 26-VI-54 (JWT); Aspen Valley 14-VII-56 (JSG); Mather 15-VII-56 (JSG); Badger Pass 23-VI-59 (JSG); Indian Flat 17-IV-61 (JWT); Jerseydale 21 to 23-VI-61 (AOS).

122. *Erynnis pacuvius lilius* (Dyar) Chowchilla Mt. 26-VI-54 (JWT, common); Tamarack Flat 3-VII-54 (JWT); Crane Flat 24-VI-59 (JSG).

123. *Erynnis propertius* (Scud. & Burg.) Ledge 9-VII-33 (JSG); Reserve

16-VII-33 (JSG); Crane Flat 3-VII-54 (JWT); Yosemite Creek 9-VII-56 (JSG); Mather 12-VII-56 (JSG), 10-VI-61 (JWT); Hetch-Hetchy Summit 13-VII-56 (JSG); Badger Pass 23-VI-59 (JSG); Briceburg 21-III-61 (KT); El Portal 21-III-61 (KT), 14-V-61 (JWT); Yosemite Valley 19-IV-61 (KT); Indian Flat 13-V and 10-VI-61 (JWT); Jerseydale 17-VI-60, 21-VI-61 and 4 to 13-VI-62 (AOS).

124. Erynnis zarucco funeralis (Scud. & Burg.) Coulterville Road VI-26 (D. D. MacLean).

125. Erynnis tristis (Bdv.) No Yosemite record.

126a. Hesperia harpalus harpalus (Edw.) Mono Lake 17-VII to 26-VIII-57, 30-VI to 20-VII-58 and 26-VI-61 (AOS), 26-VIII-57 and 20-VII-58 (JWT); Bodie 18-VII-57 (AOS); Lee Vining 24-VI-58 (AOS); Warren Creek 26-VI-61 (AOS).

Hesperia harpalus (Edw.), "blend zone" form Eagle Peak 1-VII-33 (JSG); Reserve 16-VII-33 (JSG); Yosemite Creek 9 to 17-VII-56 (JSG); Rafferty Creek 21-VII-57, 24-VII to 3-VIII-58 (AOS); Dana, W slope 16-VIII-57 and 30-VIII-58 (JWT); Crest W of Tioga Pass 18 to 20-VIII-57, 20-VIII-58 and 20 to 28-VII-60 (AOS); Merced Lake Trail 4-VIII-58 (AOS); Unicorn Peak 12-VIII-58 and 27-VII-59 (AOS); Gaylor Lakes Trail and Pilot Peak 31-VIII-58 (JWT); Tuolumne Meadows 3-IX-58 (JWT); Cold Canyon 25-VII-60 (AOS); Dana, N slope 8-VIII-60 (AOS).

b. Hesperia harpalus yosemite Leuss. Big Oak Flat Road, near entrance to Tuolumne Grove 2-IX-29 (J. Strohbeen and A. E. Dodge, the type series); Carl Inn 11-VII-31 (JWT); Wawona 27-VIII-46 (JWT); Smoky Jack 4-VII-54 (JWT); Jerseydale 1-VIII-57 (AOS).

127. Hesperia miriamae MacNeill Mono Pass, Inyo County VIII-56, VIII-57 and VIII-58 (Don MacNeill, the type series); Unicorn Peak 26-VII, 12 and 23-VIII-58, and 27-VII-59 (AOS); Cockscomb Peak 26-VII-58 (AOS); Dana, N slope 31-VII-58 and 8-VIII-60 (AOS).

128. Hesperia nevada (Scud.) Mono Lake 26-VI-61 (AOS); Warren Creek 26-VI-61 and 12-VI-62 (AOS).

129. Hesperia juba (Scud.) "Yosemite" VI-26 (collector unknown); Old Village 17-VI-32 (McQuesten); Mather 10-VI-61 (JWT). Mono Lake 27-VI-61 (AOS).

130. Ochlodes sylvanoides (Bdv.) Yosemite Valley VII-33 (JSG); Pate Valley 23-VII-34 (EDG); Hetch-Hetchy 13-VII-56 (JSG); Crane Flat 18-VIII-57 (JWT); Mather 4-IX-57 (JWT); Jerseydale 2-IX-58 (AOS). Mono Lake 14 and 15-VIII-51 and 13 to 15-VIII-52 (JWT).

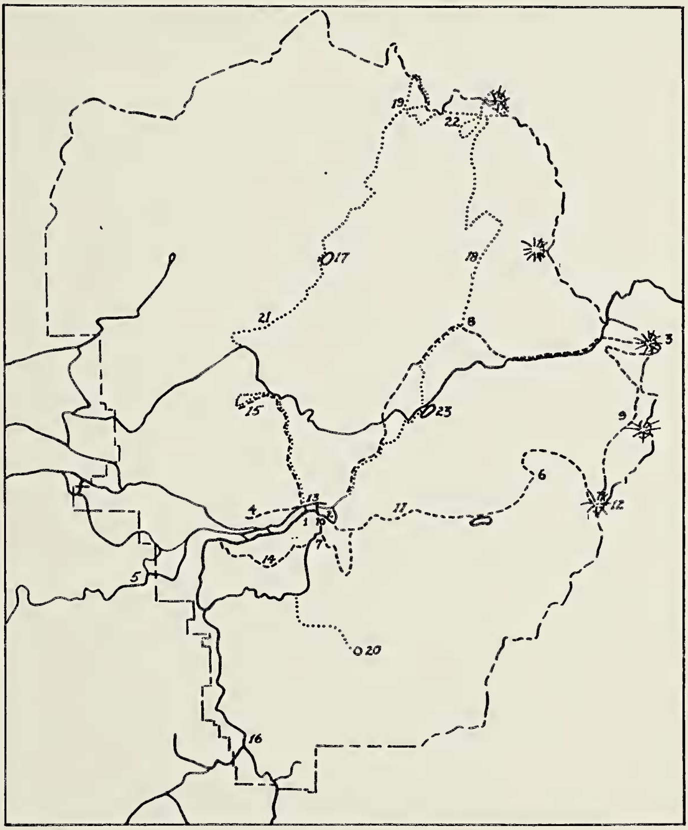
131. Ochlodes agricola (Bdv.) Darrah 29-V-59 (JWT); Indian Flat 30-V-59 (JWT); El Portal 14-V-61 (JWT).

132a. Polites sabuleti sabuleti (Bdv.) Bridgeport 14-VIII-50 and 16-VIII-51 (JWT); Mono Lake 23-VI-62 (JWT).

b. Polites sabuleti tecumseh Grin. Tioga Pass 7-VII-31, 13-VIII-50, 15-VIII-51, 18-VIII-52 and 18-VII to 16-VIII-57 (JWT), 14-VII to 7-VIII-58 (AOS); Reserve 17-VII-33 and 10-VII-56 (JSG); Kuna 7-VIII-33 (JSG); Kerrick 27-VII-34 (EDG); Snow Lake 29-VII-34 (EDG); Tuolumne Meadows 15-VIII-57 and 3-IX-58 (JWT), 15-VIII-58 (AOS); Gin Flat 17-VII-57 (JWT); Rafferty Creek 24-VII-58 (AOS), 3-VIII-58 (JSG); Upper Gaylor Lake 1-VIII-58 (JSG); Upper Lyell Base Camp 9-VIII-58 (AOS); Elizabeth Lake 12-VIII-58 (AOS); Dana, W slope 30-VIII-58 (JWT); Pilot Peak 31-VIII-58 (JWT).

133. Polites sonora (Scud.) Ledge 9-VII-33 (JSG); Reserve 17-VII-33 (JSG); Tioga Pass 16-VIII-52 (JWT); Aspen Valley 14-VII-56 (JSG); Crane Flat 18 and 19-VII-57 (JWT); Gin Flat 19-VII-57 (JWT); Tuolumne Meadows 14-VIII-57 and 3-IX-58 (JWT), 15 to 21-VIII-58 (AOS); Bridal Veil 23-VI-59 (JSG); Mather 10-VI-61 and 30-VI-62 (JWT). Mono Lake 4-VII-33, 5-VII-38, 30-VI-50 to 13-VIII-50 and 15-VIII-51 (JWT), 15-VIII-57, 30-VI-58 and 27-VI-61 (AOS); Bodie 18-VII-57 (AOS); Warren Creek 11-VIII-60 (AOS); W of Lee Vining 26-VI-61 (AOS).

134. Amblyscirtes vialis (Edw.) Yosemite Valley, Meadow near Ahwahnee Hotel 17-VI-32 (JWT); Jerseydale 17-VI-57, 22-VI-61 and 9 to 13-VI-62 (AOS).



YOSEMITE PARK

1933 LOCALITIES: 1—Camp 19; 2—Camp 9; 3—Mt. Dana; 4—Eagle Pk.; 5—El Portal; 6—Florence L.; 7—Glacier Pt.; 8—Glen Aulin; 9—Mt. Kuna; 10—Ledge Tr.; 11—Little Yosemite; 12—Mt. Lyell; 13—Museum; 14—Pohono Tr.; 15—Research Reserve; 16—Wawona.

1934 LOCALITIES: 17—Benson L.; 18—Coldwater Can.; 19—Kerrick Pass; 20—Ostrander L.; 21—Pate Valley; 22—Slide Can.; 23—Tenaya L.

KEY

——— Auto Rd. - - - - Trails Covered 1933 . . . . Trails Covered 1934

APPENDIX III

YOSEMITE LOCALITIES

West-slope localities visited by John S. Garth in 1933 (See Map 1):

1. Camp 19: Yosemite School of Field Natural History headquarters near Sentinel Bridge, floor of Yosemite Valley (3960). Transition Zone; Meadow Association.
2. Camp 9: Meadow near Camp Curry in Yosemite Valley (4000), a favorite haunt of Argynnis cybele leto. Transition Zone; Black Cottonwood; Meadow Association.
3. Dana: Trail from Tuolumne Meadows (8600) to top of Mt. Dana (13,050). Hudsonian, Arctic-Alpine Zone; Subalpine Forest; Alpine Fell-Fields.
4. Eagle: Trail from top of Yosemite Falls (6525) to summit of Eagle Pk. Canadian Zone; Red Fir Forest; Moist Meadow; Riparian Association.
5. El Portal: Highway 140 near El Portal (1919) on the Merced River; short distance up Coulterville Road. Upper Sonoran Zone; Chaparral; Stream.
6. Florence: Lake above Lewis Creek Trail (10,500). Hudsonian Zone, in close proximity to Arctic-Alpine. Subalpine Forest; Montane Meadows.
7. Glacier: Trail from Glacier Point (7214) to top of Nevada Falls (5910). Canadian Fir Forest replaced by Upper Sonoran Chaparral after fire.
8. Glen Aulin: High Sierra Camp on Tuolumne River at confluence of Conness Creek (7850). Canadian Zone; Transition elements (A. hydaspe).
9. Kuna: From Lyell Base Camp (10,600) to summit of Kuna Crest (12,000), down Dana Fork to Tuolumne Meadows (8600). Hudsonian, Arctic-Alpine Zone; cirques, tarns, snow banks, talus slopes, alpine meadows.
10. Ledge: Short trail from Camp Curry (4000) to Glacier Point (7214). Transition, Canadian Zone; steep cliffs, talus slopes, springs, stream.
11. Little Yosemite: Hanging Valley above Nevada Falls (5910) on Merced Lake Trail. Transition Zone; Jeffrey Pine, White Fir, Western Juniper.
12. Lyell: From Vogelsang Lake (10,500) to summit of Mt. Lyell (13,090). Hudsonian, Arctic-Alpine Zone; glaciers, tarns, Alpine rock gardens.
13. Museum: Garden along diverted stream behind Yosemite Museum (4000).
14. Pohono: Trail from Glacier Point (7214) over Sentinel Dome (8117) to Inspiration Point (5391). Canadian and Transition Zone; stream, meadow.
15. Reserve: Boundary Hill Research Reserve, a 25-square-mile area bounded by the Tioga Road, Yosemite Creek, Cascade Creek, and the north rim of Yosemite Valley. (6525 - 9200). Canadian Zone with weak Hudsonian atop Research Ridge; Red Fir Forest; Lodgepole Pine; Western Juniper.
16. Wawona: Highway 41 (Wawona Road) from Chinquapin (6266) to Wawona (4096). Transition Zone; Dry Hillside; Monardella and Erysimum.

West-slope localities visited by Edmund D. Godwin in 1934 (See Map 1):

17. Benson: Trail from Pate Valley (4500) over Pleasant Ridge (8000) to Pleasant Valley (7000) and Benson Lake (8000). Transition, Canadian Zone; Upper Sonoran influence (Cercyonis silvestris, Coenonympha).
18. Coldwater: Trail from Virginia Creek (8500) to Glen Aulin (7800) along Coldwater Canyon. Canadian Zone; Red Fir Forest; Riparian Assoc.
19. Kerrick: Trail from Benson Lake (8000) through Seavey Pass (9100) to Kerrick Canyon (8900), thence to Kerrick Meadows (9400). Canadian to Hudsonian Zone; Red Fir, Lodgepole Pine Forest; Montane Meadow.

20. *Ostrander*: Trail from Glacier Point Road (7100) to Ostrander Lake (8500). Canadian to Hudsonian Zone border (*Tsuga mertensiana*).
21. *Pate*: Trail from Harden Lake (7575) down north-facing granite slope to Pate Valley (4500). Canadian to Transition Zone; Upper Sonoran influence from opposite exposure. *Monardella* and *Umbellularia*.
22. *Slide*: Trail from Kerrick Meadows (9400) to Snow Lake (10, 200) to Slide Canyon (10, 000). Hudsonian Zone; Subalpine Meadow Association (*Colias behrii*).
23. *Tenaya*: McGee Lake Trail from Glen Aulin (7850) on the Tuolumne River to Tenaya Lake (8141). Canadian Zone; Red Fir; Lodgepole Pine.

Western Foothill localities visited from 1956 to 1962, mostly outside Yosemite National Park:

24. *Bear Creek Lodge*: On Highway 140 between Midpines (2477) and Briceburg (1186). Transition Zone; Yellow Pine Forest; Riparian Association.
25. *Big Oak Flat Road*: Highway 120, the part between Groveland (2846) and Carlon (4624) within Stanislaus N F. Upper Sonoran, Transition Zone.
26. *Briceburg*: Mariposa Co., on Highway 140 in Merced River Bottom (1186). Upper Sonoran Zone; Chaparral and Coastal Sage Scrub.
27. *Buck Meadows*: Stanislaus N F, on Highway 120 (3006). Transition Zone; Yellow Pine Forest with "Mountain Misery" (*Chamaebatia*) understory.
28. *Carl Inn*: Stanislaus N F, at juncture of Hetch-Hetchy Road to Mather and Old Tioga Road (4718). Transition Zone; Mixed Forest, cut over.
29. *Cathay*: Mariposa Co., on Highway 140; Upper Sonoran; Oak Woodland.
30. *Chowchilla Mtn.*: Sierra N F, W of Fish Camp (4982) on Chowchilla Mtn. Road, near Bear Wallow turnoff. Canadian Zone; Red Fir Forest.
31. *Cliff House*: Stanislaus N F, on Highway 120 N Fork, Tuolumne River, crossing. Transition Zone; Yellow Pine Forest; Yerba Santa.
32. *Darrah*: Mariposa Co. (3400). Upper Sonoran, Transition Zone; Chaparral; Coastal Sage Scrub; Yellow Pine, Mixed Forest; Riparian Assoc.
33. *El Portal*: Yosemite N P, on Highway 140 in Merced River Bottom (1919). Upper Sonoran Zone; Chaparral, Coastal Sage Scrub; Riparian Assoc.
34. *Groveland*: Stanislaus N F, on Highway 120 (2846). Transition and Upper Sonoran Zone; Yellow Pine Forest; Mixed Forest; Chaparral.
35. *Highway 120 and Hetch-Hetchy Road*: Juncture, Big Oak Flat Road and Mather Road (4624). Upper Sonoran, Transition; Oak Wood; Yellow Pine.
36. *Indian Flat*: Sierra N F, on Highway 140 in the Merced River bottom (1553). Upper Sonoran Zone; Coastal Sage Scrub, Chaparral; Yellow Pine.
37. *Jerseydale*: Sierra N F, (3800). Transition Zone; Yellow Pine, Mixed Forest; *Chamaebatia*, *Monardella* (*Argynnis hydaspe*); some Meadowland.
38. *Mariposa*: Mariposa Co., on Highway 140 (2046). Upper Sonoran, Transition Zone; Chaparral, Coastal Sage Scrub; Mixed Forest; Riparian Assoc.
39. *Mather*: Stanislaus N F (4522), on Hetch-Hetchy Road. Transition Zone; Yellow Pine, Mixed and White Fir Forest; Montane Meadow; Riparian. Includes Carnegie Experimental Garden (Hog Ranch) 1 mi NE of Mather.
40. *Oakhurst*: Madera Co., on Highway 41. Upper Sonoran Zone; Foothill Woodland; Oak and Digger Pine with *Ceanothus* and grass (*Coenonympha*).

West-Slope Mid-Elevation Localities visited from 1956 to 1962, all within Yosemite National Park:

41. *Aspen Valley*: On Old Tioga Road above turnoff from Mather Road at Carl Inn (6390). Canadian Zone; Red Fir Forest; Montane Meadow; lupine.

42. *Badger Pass*: Meadow beside Badger Pass Ski Lodge on Glacier Point Road (7300). Canadian Zone; Red Fir Forest; Wet Meadow Association.
43. *Bridal Veil*: Public Camp on Bridal Veil Creek where crossed by Glacier Point Road (7000). Canadian Zone; Red Fir Forest; Riparian Assoc.
44. *Crane Flat*: On Highway 120 where it becomes the Tioga Road (6192). Transition Zone; Mixed Forest; Montane Meadow. Also roadside above.
45. *Gin Flat*: On Tioga Road above Crane Flat (7036). Canadian Zone; Montane Meadow.
46. *Glacier Point*: Road to, with maximum elevation 7800 feet. Canadian Zone; openings in Red Fir Forest; Montane Meadow; Riparian Assoc.
47. *Hetch-Hetchy*: Road from Mather (4522) to Hetch-Hetchy Reservoir (3796). Upper Sonoran Zone; Digger Pine; Manzanita. Summit (5027) Transition Zone; White Fir Forest; Streamside Association; lupine.
48. *Mirror Lake*: Floor of Yosemite Valley (4082). Transition Zone; Black Oak, White Fir, Incense Cedar, Cottonwood, *Ceanothus*, Coffee Berry.
49. *Old Village*: Yosemite Valley floor (3964). Transition Zone; Riparian.
50. *Research Reserve*: Meadow in Blue Jay Creek (7900). Canadian Zone; Red Fir, Lodgepole Pine. Research Ridge (8700) Dry Hillside Assoc.
51. *Smoky Jack*: Public Camp on Tioga Road above Gin Flat. Canadian Zone; Red Fir Forest; Montane Chaparral.
52. *Tamarack Flat*: Meadow above Tamarack Public Camp on Tioga Road (6390). Upper Canadian Zone; Red Fir; Lodgepole Pine; *Ceanothus*.
53. *Tioga Road*: North-facing slope 1 mi W of White Wolf turnoff (8000) and first summit beyond White Wolf (8090). Canadian Zone; Red Fir Forest.
54. *Tuolumne Grove*: On Highway 120 W of Crane Flat (5500-6000). Transition Zone; Mixed Forest; Big Tree; Riparian Assoc. *Polygonia zephyrus*.
55. *White Wolf*: One mi N of Tioga Road (8090). Canadian Zone; Red Fir Forest; Montane Meadow Assoc. *Plebejus saepiolus*, *P. glandon podarce*.
56. *Wawona*: Open forest between Wawona Lodge (4096) and the turnoff to Giant Forest (4350). Transition Zone; Yellow Pine Forest.
57. *Yosemite Creek*: Trail S from Public Camp on Tioga Road (7200). Canadian Zone; Riparian and Wet Meadow; Western Juniper on drier slopes.
58. *Yosemite Valley*: Floor of Valley (4000). Transition Zone; Mixed Forest; Riparian Association. Includes Meadow near Ahwahnee Hotel. *A. vialis*.

High Country localities visited since 1956 (those near Tioga Pass since 1929):

59. *Agnew Pass*: Inyo N F (9946). Hudsonian Zone; open sage slope.
60. *Bert Lake*: N slope of Mt. Maclure (11, 700); Arctic-Alpine; rock gardens.
61. *Cockscomb Peak*: Cathedral Range (11, 000); Arctic-Alpine; White-Bark Pine; gradual slope; *Spraguea* in gravelly areas. *Hesperia miriamae*.
62. *Dana, N slope*: (11, 000-13,050). Arctic-Alpine; rockslides, flowers, grass. *Lycaena p. hypophlaeas*. Dana, W slope: From Tioga Pass (9941) to timber line (11, 000). Hudsonian to Arctic-Alpine; Subalpine Forest; Alpine Fell-Fields.
63. *Dog Lake Trail*: From Tuolumne Meadows (8600) to Dog Lake (9240). Hudsonian Zone; Subalpine Forest; talus slides; rock gardens. *Lycaena cupreus*.
64. *Donohue Pass*: Inyo N F (11, 100). Arctic-Alpine; meadows, exposed rock.
65. *Elizabeth Lake*: Cathedral Range (9500). Hudsonian Zone; Lodgepole Pine; meadows, willows, heather. Lycaena mariposa, Polites s. tecumseh.
66. *Gaylor Lakes*: Above Tioga Pass Checking Sta. (10, 500). Arctic-Alpine; Alpine Fell-Fields. Includes Upper Gaylor Lake. *Melitaea d. malcolmi*.
67. *Glen Aulin*: On Tuolumne River (7850). Canadian Zone; Jeffrey Pine; arid slope.

68. *Helen Lake*: E of Kuna Crest (10,896). Arctic-Alpine; White-Bark Pine.
69. *Hoffmann, Mt.*: W of May Lake (10,921). As above; flowers in gravel.
70. *Lembert Dome*: N of Tuolumne Meadows (9400). Hudsonian; forested.
71. *Lyell Base Camps*: Head of Lyell Fork (11,000). Arctic-Alpine; treeline.
72. *Lyell Fork Meadows*: (9000). Hudsonian; Lodgepole Pine; willow stream.
73. *Ottoway Lake*: Clark Range (8000). Canadian Zone; Red Fir Forest.
74. *Mammoth Peak*: N end, Kuna Crest (12,225). Arctic-Alpine; exposed.
75. *Merced Lake Trail*: From Merced Lake (7100) to Tuolumne Pass (10,100) via Fletcher Creek. Canadian to Hudsonian; Coniferous Forest; Meadows.
76. *Mono Pass*: Inyo N F (10599). S of Tioga Pass, between Mt. Gibbs and *Mt. Lewis*. Arctic-Alpine; Alpine Fell-Fields. *Hesperia miriamae*.
77. *Pilot Peak*: NW above Tioga Pass via Gaylor Lakes Trail (11,100). Hudsonian, Arctic-Alpine; Subalpine Forest, Alpine Fell-Fields. (See 81).
78. *Rafferty Creek*: (8600-10,100). Hudsonian; Lodgepole Pine; Riparian.
79. *Saddlebag Lake*: Inyo N F (10,050). Upper Hudsonian and Arctic-Alpine; few trees, willows, grasses, some rock. Includes *E above* (10,500).
80. *Tioga Meadow*: (9941). Montane Meadow E of Tioga Pass Checking Sta.
    Tioga Pass: (9941). Hudsonian Zone; Subalpine Forest; Glacial Moraine.
81. *Tioga Pass*, NW above: (10,500-11,000). Tree-line Association; rock gardens. *Parnassius p. behrii*, *Pieris o. calyce*, *Oeneis c. ivallda*.
82. *Tenaya Canyon*: (4,000-8,000, average 6,000). Canadian Zone; stream bed choked with firs, aspen, willows; exposed slopes (*Philotes enoptes*).
83. *Thousand Island Lake*: Inyo N F (9850). Hudsonian; Lodgepole Pine; sage.
84. *Tuolumne Meadows*: On Tioga Road (8600). Hudsonian; Lodgepole Pine. extensive meadows. Site of Lembert Homestead; metropolis of *C. behrii*.
85. *Unicorn Peak*: Cathedral Range (10,849). Arctic-Alpine; boulder jumble.
86. *Vogelsang*: Trail from Vogelsang Camp (10,100) to Vogelsang Pass (10,400) and below. Hudsonian, Arctic-Alpine; Subalpine Forest; Alpine Fell-Fields.

East-slope localities visited during survey; mostly Mono Basin; all outside Yosemite National Park:

87. *Bodie*: 11 mi E of Highway 395 (8369). Pinyon; Great Basin Sage; Meadow.
88. *Bridgeport*: On Highway 395 (6743). Willow Thicket; Riparian Association.
89. *Casa Diablo Hot Springs*: Inyo N F, on Highway 395 (7198). Transition; Great Basin Sage Brush in Jeffrey Pine Forest; sparse Streamside Assoc.
90. *Conway Pass*: On Highway 395 N of Mono Lake, 200 ft. below Summit (8136). Great Basin Scrub (Desert Peach, *Chrysothamnus*, *Purshia*); Montane Meadow; Aspen Grove.
91. *Deadman Summit*: Inyo N F, on Highway 395 (7734 or 8168). Transition; Jeffrey Pine Forest; *Purshia*, *Artemesia*, *Chrysothamnus*, *Eriogonum*.
92. *Gull Lake*: Inyo N F (7600), on June Lake circuit. Moist Montane Meadow; Willow Thicket; Brownie Thistle (*Cirsium acaulescens*). *A. n. apacheana*.
93. *June Lake*: Inyo N F (7716). Junction of Highway 395 and June Lake Road. Transition; Jeffrey Pine Forest; Great Basin Sage. *Neophasia menapia*.
94. *Lee Vining Creek*: Inyo N F (7000). Above turnoff to last campground on Tioga Pass Road. Dry Hillside; Manzanita; *Ceanothus*, Bitter Cherry.
95. *Mono Lake*: (6419). Many associations in close proximity: Freshwater Marsh, Salt Sink Margin, Willow Thicket, Aspen Grove, Moist Meadow.
96. *Mammoth*: Inyo N F (7900). On Highway 395, about 2-3 mi below. Transition; Jeffrey Pine Forest; Great Basin Sage Brush; Great Basin Scrub.
97. *Lundy*: Inyo N F (7766). Sage, Aspen, Willow. Collecting to 8700 feet.
98. *Warren Creek*: Inyo N F (9000-9500). N fork of Lee Vining Creek above Tioga Road crossing. Canadian Zone; willowed stream, sage-aspen slope.